

NATIONAL
INFRASTRUCTURE
COMMISSION

ANNUAL MONITORING REPORT 2018



Foreword

At the foundation of the National Infrastructure Commission it was agreed that, as well as providing advice on national infrastructure priorities, the organisation would play a key role in holding the Government to account for delivering on its promises. It is right that elected politicians should have the final say on whether to approve major infrastructure schemes and policies. But once a decision has been taken to proceed, it is also right that the Government should be held to account for delivering on its commitments.



This report represents the first of what will become an annual series monitoring the Government's progress in areas where it has committed to taking forward recommendations of the Commission. Over time the Commission's monitoring function will expand to cover the recommendations made in its forthcoming National Infrastructure Assessment. Nevertheless, even at this early stage in the life of the institution, there is much to review.

The length of this first report is a testament to the breadth of the Commission's work to date. In a little over two years the Commission has produced six studies and made a total of 45 recommendations across a range of sectors. This report finds that while good progress has been made in some areas – with firm plans now in place, for example, to support a smarter and more flexible energy system – there is more to do across a range of other issues.

From increasing digital connectivity on the UK's road and rail networks, to improving connections between the major cities of Northern England and opening new areas for housing growth in and around the capital through the construction of a new Crossrail 2 line, the Commission finds that further action is required to provide the UK's growing population and economy with the infrastructure it needs to thrive and compete on the global stage.

Following the 2017 general election, the Commission also published a post-election statement highlighting 12 major priorities where urgent action was required to support key infrastructure programmes which were already government policy. Here again, the Commission finds that progress has been mixed, with some priorities being well addressed by Government and others facing delay or a lack of certainty.

Planning and delivering major infrastructure is often complex, but the UK has shown itself capable of successfully delivering a range of major projects in recent years, from the Queensferry Crossing in Scotland and the redevelopment of Birmingham New Street Station to the construction of the new Elizabeth Line linking east and west London. The challenge for Government and industry is now to replicate this success across the full range of policies and programmes set out in this report.

Sir John Armitt CBE
Chairman

Contents

Foreword	2
Contents	3
In Brief	4
Executive Summary	5
The Commission's studies: update	13
Smart Power (March 2016)	14
Transport for a World City (March 2016)	26
High Speed North (March 2016)	36
Connected Future (December 2016)	50
Partnering for Prosperity (November 2017)	65
Data for the Public Good (December 2017)	72
The Commission's 12 priorities: update	76
1. South-East Airport Capacity	77
2. High Speed 2	78
3. Northern Powerhouse Rail	79
4. Crossrail 2	79
5. Eastern Crossings of the River Thames	80
6. Flexible Power Systems	81
7. Renewable Energy	82
8. Decarbonisation of Energy	82
9. Hinkley Point C / Euratom	83
10. Broadband and Mobile	83
11. 5G Mobile	84
12. Water and Flood Defenses	85
Appendix	87
Endnotes	88

In Brief

The National Infrastructure Commission assesses the UK's long-term infrastructure needs, provides impartial, expert advice on how to meet these, and holds the Government to account for delivery. This first Annual Monitoring Report sets out its views on the Government's progress.

The Commission has found encouraging developments in the delivery of a smart electricity system. The Government has significantly increased its digital capability and Ofcom now measures mobile coverage in a way that reflects consumers' real-world experience. The Commission is also pleased to see significant funding announced at the recent Budget to improve infrastructure and housing delivery in the Cambridge-Milton Keynes-Oxford arc.

However, there are several areas where further progress is required. Mobile coverage on the UK's major roads and railways remains poor and plans for deploying 5G infrastructure have not progressed beyond trials. Despite the Government's support for improved connectivity in Northern England, there is still no agreed plan between the Government and the northern authorities for either Manchester Piccadilly station or for the wider Northern Powerhouse Rail network. Also, whilst the Government has indicated its support for Crossrail 2, its call for an independent review of funding and financing risks delaying the programme from the originally proposed opening date of 2033.

The Commission calls on the Government to address these delays as a matter of urgency, accelerating work to identify the best approach to enhancing mobile coverage on road and rail, and setting out clear timetables and funding proposals for Crossrail 2 and Northern Powerhouse Rail by the end of the year.

The Commission is also concerned by continued delays to some nearer-term priorities such as the Silvertown Tunnel and by the lack of progress in managing surface water flooding. It is also crucial that a Parliamentary vote on expanding the UK's aviation capacity takes place without further delay in summer 2018.

The Government has shown itself capable of successfully delivering major infrastructure schemes across the country and putting in place the measures required by business, industry and the public sector to support the nation's infrastructure needs. The challenge now is to ensure it takes timely decisions on a range of critical schemes currently awaiting approval and provides the infrastructure that the UK needs to be competitive in the global economy and to enhance people's quality of life.

Executive Summary

The National Infrastructure Commission was formally established in January 2017 and this is its first Annual Monitoring Report. It covers the following studies where recommendations have been endorsed by the Government:

- *Smart Power* (published March 2016)
- *Transport for a World City* (published March 2016)
- *High Speed North* (published March 2016)
- *Connected Future* (published December 2016)

Two other studies have been completed. *Partnering for Prosperity: a new deal for the Cambridge-Milton Keynes-Oxford Arc* was published in November 2017; and *Data for the Public Good* was published in December 2017. The Government has committed to responding formally to the Commission's reports within six months wherever practicable, and so these will be covered in subsequent Annual Monitoring Reports. This report, summarises the recommendations of both reports and sets out initial Government actions.

Additionally, in June 2017 the Commission published a post-election statement setting out 12 priority actions for Government to take by the end of 2017, in areas where there were already commitments in principle. This report also sets out progress against these actions.

Smart Power

In October 2015, the Commission was asked to consider how the UK could better balance electricity supply and demand, aiming towards an electricity market where prices are reflective of costs to the overall system.

Smart Power was published in March 2016. The Commission's central finding was that a smarter electricity system, built principally around three innovations – interconnection, storage, and demand flexibility – could save consumers up to £8 Billion a year by 2030, help the UK meet its 2050 carbon targets and secure the UK's energy supply for generations.

In the report, the Commission made six recommendations:

- Government should pursue additional interconnectors with other European countries where the benefits are most significant;
- the UK should become a world leader in electricity storage systems;
- the UK should make full use of demand flexibility by improving regulation, informing the public of its benefits and piloting business models;

- the system operator must create new markets that will allow open competition for the services it procures and ensure it keeps pace with the network it oversees;
- enabling the transition to more actively managed local networks should be a Government priority; and
- where upgrades to networks are needed, Ofgem should continue its work in encouraging network companies to make long term strategic decisions.

The Government responded to the report in April 2017, endorsing all the Commission's recommendations. The Government reiterated its commitment to interconnection and Ofgem has continued to appraise new projects for support under a 'cap and floor' regulatory regime, approving in principle three new projects in January 2018. The recommendations on storage and demand flexibility were taken forward jointly by the Government and Ofgem, culminating in the publication of a Smart Systems and Flexibility Plan in July 2017. The Government and Ofgem announced their intention to create greater independence for the system operator, and Ofgem is consulting on future regulatory arrangements.

In December 2017, after a request from Ofgem and the Government, the Energy Networks Association published a report setting out the changes that will be required to support the evolution from traditional network operation to new Distribution System Operator functions, as the energy system becomes smarter and more efficient.

The Commission is pleased that the recommendations in Smart Power have been taken forward, and that there is a clear commitment from the Government and Ofgem to deliver the benefits of a smart electricity system that the report identified. The Commission urges the Government and Ofgem to continue levelling the playing field for demand-side response and other flexible forms of capacity, so that they can compete in the energy, capacity and ancillary services markets.

Transport for a World City

In October 2015, the Chancellor asked the Commission to advise the Government on the case for additional large-scale transport infrastructure in the capital and its surrounding region.

Transport for a World City was published in March 2016. The Commission's central finding was that Crossrail 2 should be taken forward as a priority, with funding made available to develop the scheme with the aim of submitting a hybrid Bill by autumn 2019. This would enable Crossrail 2 to open in 2033.

In the report, the Commission made seven recommendations in the following areas:

- Crossrail 2 should be taken forward, subject to the Government also taking forward the other recommendations;
- Crossrail 2 should be at the heart of the London Plan, integrated with smaller scale interventions by Transport for London and planned alongside other high-value schemes;
- sufficient funds should be released by the Department for Transport (DfT) and Transport for London (TfL) to submit a revised business case for Crossrail 2 by March 2017 with the aim of introducing a hybrid Bill by autumn 2019. The business case should identify clear proposals to maximise benefits and increase deliverability;

- a 'London deal for Crossrail 2' funding arrangement, where London contributes more than half of the cost of the scheme, should be agreed ahead of the hybrid Bill submission;
- development of Crossrail 2 should include a clear, transformative plan to turn the proposed 200,000 houses into a reality; and
- the opportunity should be taken to maximise private sector involvement in the development and funding of stations and their surrounding areas.

The Government responded to the report in April 2016, endorsing all of the Commission's recommendations. £80 million was provided from central Government which, alongside a similar contribution from London, allowed development of the scheme to progress.

In March 2017, TfL submitted a business case to the Government. The Government initiated a review by the Infrastructure and Projects Authority and then commissioned further work in July 2017 on affordability and maximizing the benefits, as part of a joint statement of support from the Mayor of London and the Secretary of State for Transport. In November 2017, the Government announced a further independent review of Crossrail 2, with conclusions expected in 2018.

The Commission calls on Government to ensure the independent review of the funding and financing of Crossrail 2 is completed as soon as possible, with a view to setting out a firm timetable and funding proposal by the end of 2018. The next stage of consultation should then follow to enable the introduction of a hybrid Bill later this Parliament, with the overall aim of opening Crossrail 2 in the early to mid-2030s.

High Speed North

In October 2015, the Chancellor asked the Commission to carry out a study into the long term inter-urban transport needs of the north of England, drawing upon Transport for Northern England (TfN's) developing plan to radically improve connectivity between northern cities, including potentially through high speed lines.

High Speed North was published in March 2016. Its central finding was that Northern England transport networks needed both significant short-term investment and a plan for longer-term transformation to reduce journey times, increase capacity and improve reliability.

In the report, the Commission made 11 recommendations in the following areas:

- ensuring that transformations in transport connectivity form part of a broader strategy of improvements in education, training, research, planning and wider investment;
- providing funding to further develop the long-term plan for HS3;
- production of a single integrated transport strategy by TfN by the end of 2017 that supports the overall plan for HS3 and brings together the upgrade of the trans-Pennine line, the design of the northern phase of the HS2 network and the redevelopment of Manchester Piccadilly station. The strategy should also assess the case for early enhancements elsewhere on the network;

- accelerating capacity enhancements to the M62 between Liverpool, Manchester and Leeds, with work beginning in 2017/18, and prioritising development funding for a package of further enhancements including on the M56 and M1;
- continuing with the programme of longer-term studies into road development; and
- providing sufficient funding for the development of an ambitious cross-modal strategy for northern transport with HS3 at its heart.

In its April 2016 response, the Government accepted all the Commission's recommendations.

Some progress has been made in progressing the recommendations. Many of the road junction and capacity improvements identified in the Commission's report are now being developed by Highways England. TfN published its draft Strategic Transport Plan on 16 January 2018, which sets out TfN's proposed strategy for HS3 (now renamed Northern Powerhouse Rail), alongside updates on other major infrastructure upgrades and proposals for shorter-term improvements to road and rail networks.

Legislation is currently in process to establish TfN as a sub-national transport body by April 2018, giving additional status to its final Strategic Transport Plan and providing it with greater operational identity and independence.

The Commission welcomes the ongoing work of TfN and the DfT in developing the business case for Northern Powerhouse Rail. **Following the planned submission of a Strategic Outline Business Case, the Commission calls on the Government to provide clarity, before the end of 2018, on the timetable and funding envelope to deliver the Northern Powerhouse Rail network.**

Progress has been slower with respect to the Commission's recommendation on the redevelopment of Manchester Piccadilly station. *High Speed North* identified the need to integrate HS2 and HS3 (now referred to as Northern Powerhouse Rail or NPR) with other rail services at the station to maximise the benefits of both schemes. The report also recognised that the station development could unlock significant regeneration and commercial development potential in the surrounding area.

The Commission welcomes the establishment of the Manchester Piccadilly Joint Board to provide advice on the development and implementation of a new scheme for Manchester Piccadilly station. **It calls on the Government and other relevant stakeholders to work together to agree a preferred redevelopment option by the end of 2018, as part of the overall NPR strategy, so that any changes necessary to the HS2 phase 2b Bill can be made without delay.**

Connected Future

In March 2016, the Commission was asked to advise the Government on the steps the UK should take in order to become a world leader in the deployment of 5G mobile telecommunications networks, and ensure that the UK can take early advantage of the applications those networks may enable.

Connected Future was published in December 2016. The Commission's central finding was that mobile connectivity has become a necessity. The market and existing regulatory frameworks have driven great advances since the advent of the mobile phone but Government must now play an active role to ensure that basic services are available wherever people live, work and travel. The UK's roads, railways and city centres must also be made 5G ready as quickly as possible.

The report made seven recommendations in the following areas:

- digital infrastructure at the heart of Government;
- improving connectivity on railways and major roads;
- engaging local Government in 5G infrastructure;
- providing meaningful measures of coverage; and
- regulation that is fit for the connected future.

The Government responded to the report in March 2017, broadly endorsing its recommendations, but in some cases highlighting areas of further work that would be required before a firm way forward could be identified or identifying alternative approaches to meet the proposed objective. A further update to its 5G strategy was published in December 2017.

Some progress has been made in implementing the Commission's recommendations. The Secretary of State for Digital, Culture, Media and Sport has been given overall responsibility for digital infrastructure, and various cross-Whitehall groups have been set up to join up digital infrastructure issues. The Department for Digital, Culture, Media and Sport (DCMS) has strengthened its digital and telecoms capabilities, recruiting new staff during 2017.

The Government has set aside money for 5G testbeds and trials, including on transport networks. Ofcom has developed more meaningful measures of mobile coverage – this has revealed a worse position than had previously been measured and highlighted the urgent need to improve existing mobile networks. The Commission has written to Ofcom, challenging it to come up with a plan for the Government to radically improve mobile coverage in the short to medium term.

However, in other cases progress has been slower – in particular the development of commercial models for enhancing road and rail connectivity, on which the Government had committed to report by the end of 2017. While trials of high-speed mobile infrastructure on roads and railways are being launched, no preferred option has been identified for providing 5G-compliant mobile infrastructure on the motorway network or major rail lines.

The Commission calls on Government to accelerate its work on assessing commercial models for the deployment of 5G-ready infrastructure across the UK's motorways and major rail lines, in order to enable delivery by 2025 at the latest and meet the long-term connectivity needs of connected and autonomous vehicles and of road and rail passengers.

Several reports are due in 2018 that will help with implementing the recommendations of the *Connected Future* report. These include a response to the proposals for local planning authorities to enable digital infrastructure delivery set out in the Government's housing White Paper, and also the Future Telecoms Infrastructure Review being carried out by DCMS. A response to the department's recent Call for Evidence on commercial options for delivering mobile connectivity on trains is also expected. In addition, Ofcom will make several decisions on spectrum allocation and auctions in 2018. The Commission will continue to hold the Government and Ofcom to account in these areas to ensure that the endorsed recommendations are taken forward.

Partnering for Prosperity: A new deal for the Cambridge-Milton Keynes-Oxford arc

In March 2016, the National Infrastructure Commission was asked to consider how to maximise the potential of the Cambridge-Milton Keynes-Oxford arc as a single, knowledge-intensive cluster that competes on a global stage, protecting the area's high-quality environment, and securing the homes and jobs that the area needs.

In November 2016, an interim report was published which concluded that a lack of sufficient and suitable housing presented a fundamental risk to the success of the area and that without a joined-up plan for housing, jobs and infrastructure across the corridor, it would be left behind by its international competitors. By providing the foundations for such a strategy, new east-west transport links presented a once-in-a-generation opportunity to secure the area's future success.

The final report was published in November 2017. The Commission's central finding was that rates of house building will need to double if the arc is to achieve its economic potential. This would require a new deal between central and local Government – one which aligned public and private interests behind the delivery of significant east-west infrastructure and major new settlements, and which sought commitment to faster growth through a joined-up plan for jobs, homes and infrastructure. Any deal would also need to give local areas the certainty, freedoms and resources they need to create well-designed, well-connected new communities.

On this basis, the Commission recommended:

- the Government should progress work on East West Rail, the Oxford-Cambridge Expressway and new settlements through a single, coordinated delivery programme;
- locations for new and expanded settlements should be agreed by 2020, establishing appropriate delivery vehicles for their delivery;
- an independent design panel should be established for East West Rail, the Expressway and new and expanded settlements;
- local and national Government should work together to increase certainty on the delivery of growth-enabling local infrastructure;
- changes should be made to the operation and application of s106 agreements and Community Infrastructure Levy arrangements in the arc to improve the financing of infrastructure;
- changes to the application of five-year land supply requirements;
- local authorities and Local Economic Partnerships (LEPs) should work together to develop an arc-wide spatial vision and define sub-regional planning areas; and
- Government should work with local authorities to put in place robust sub-regional and arc-wide governance arrangements.

Shortly after the final report was published, the Government set out an initial package of measures to address the Commission's recommendations. These included:

- supporting the Commission's ambition for up to 1 million new homes in the arc by 2050, including the intention to consider the development of major new settlements;
- committing to funding the western section of East-West Rail, from Oxford to Bedford and Aylesbury to Milton Keynes by 2024;
- accelerating development of the central section of East-West Rail, between Bedford and Cambridge for completion by the mid-2020s;
- commitment to the Oxford-Cambridge Expressway 'missing link' between the M1 and Oxford, to be open by 2030;
- agreeing a housing deal with Oxfordshire, committing to a target of 100,000 homes by 2031, and developing joint statutory plans for the central and eastern parts of the arc;
- encouraging authorities to explore the introduction of a Strategic Infrastructure Tariff, in addition to CIL, to provide funding towards future development and ensure local communities benefit from investments; and
- announcing Iain Stewart MP as the Champion for the corridor.

Given the clear indication of the direction of travel of the Commission's interim recommendations, subsequent discussion of the draft final recommendations with the Government, and the initial measures announced at the Autumn Budget, the Commission hopes that the Government's formal response will be published no later than May 2018 – six months after the report's publication.

Data for the Public Good

In November 2016, the Government asked the Commission to identify which emerging technologies have the most potential in terms of optimising the management, performance and maintenance of existing and future infrastructure assets to support economic growth.

Data for the Public Good was published in December 2017. The Commission's central finding was that new technologies, such as data capture and processing technologies (sensors, artificial intelligence and digital twins) can generate and manage better quality data about infrastructure, which can be used to improve the way that assets are planned and maintained. If action is taken to create and share data efficiently and securely, the productivity of the nation's existing and future infrastructure could be improved and the potential cost and risk of future infrastructure breakdown and attack could be minimised. In short, this could increase the performance, efficiency and resilience of the national infrastructure system.

In the report, the Commission made four recommendations:

- the Centre for Digital Built Britain should establish a digital framework for infrastructure data;

- the Infrastructure Client Group and Digital Framework Task Group chair should lead industry engagement in the framework and seek to move towards minimum levels of commercial confidentiality,
- the Government should look to strengthen the role of economic regulators in improving the quality and openness of infrastructure data, and
- the Centre for Digital Built Britain should work with other institutions in pioneering digital twin models of UK infrastructure with predictive capability.

In the Commission's Charter, the Government commits to respond within six months in the majority of cases i.e. by June 2018. The Commission will consider progress against endorsed recommendations in next year's Annual Monitoring Report.

Post-election statement – priority actions for Government

In June 2017, the Commission published a list of 12 immediate infrastructure priorities for the new Government. In each case, there was a commitment in principle to the project or policy, but there was also a risk that without timely ministerial decisions these projects could stall or collapse entirely. Some of the priorities re-iterated recommendations made by the Commission in its published studies.

Progress has been made against most of the priorities. In energy, the publication of the Smart Systems and Flexibility Plan and the Clean Growth Strategy, coupled with announcements in the Autumn Budget on renewables support and carbon floor price, have provided a clear direction for the transformation of the energy system. In telecoms, the Government has set out plans for a Universal Service Obligation on broadband, and in water it has published a Strategy and Policy Statement for Ofwat. The HS2 Bill is proceeding as planned through Parliament and the Lower Thames Crossing is also on course.

However, there have been delays to Crossrail 2, Silvertown Tunnel and plans for further Thames crossings. There has been little progress on the issue of surface water flooding, and plans to deal with the UK's departure from Euratom remain subject to further negotiation.

In addition, the proposal for a third runway at London Heathrow reaches a critical stage in 2018 as the Government's National Policy Statement for airports is finalised. It is crucial that the Government continues drive forward this programme of work such that, once the remaining scrutiny processes are complete, a parliamentary vote takes place on the National Policy Statement as early as possible in summer 2018.

The Commission's studies: update



Smart Power (March 2016)

In October 2015, the National Infrastructure Commission was asked to consider how the UK could better balance electricity supply and demand, aiming towards an electricity market where prices are reflective of costs to the overall system.

Smart Power was published in March 2016. The Commission's central finding was that a smarter electricity system, principally built around three innovations – interconnection, storage, and demand flexibility – could save consumers up to £8 billion a year by 2030, help the UK meet its 2050 carbon targets, and secure the UK's energy supply for generations.

A full update on progress in implementing each recommendation is set out below.

Recommendation 1

Government should pursue additional interconnectors with other European countries where the benefits are most significant.

Interconnection investment decisions should continue to sit primarily with the private sector but there is a role for Government-led diplomacy to unlock those markets that can offer potentially large benefits to UK consumers. The Government should therefore focus its efforts on exploring increased interconnection to markets with abundant sources of flexible low carbon electricity, such as Norway and Iceland.

Government Response (April 2016)

The Government agrees with the commission that more interconnection is in the interests of consumers, will make an important contribution to security of supply and can help integrate more clean energy into the energy system. The Government also agrees that investment decisions should sit primarily with the private sector.

The Government believes a mix of short and long interconnection links remains appropriate. For longer interconnection links, the Government is particularly interested in projects that can provide reliable, clean power, which naturally complements the developing generation mix in the GB market. The regular UK-Norway energy dialogue continues with a meeting in April to discuss further interconnection to Norway, and work with the Icelandic Government continues through a dedicated taskforce set up by the Prime Minister and due to report in May.

The Government has previously stated that an increase of 5GW of additional interconnection capacity could be considered beneficial to GB consumers. Given evidence provided by Ofgem and the commission, the Government now supports the market delivery of at least 9GW of additional interconnection capacity, believing this to be beneficial to consumers. The Government's assessment of the level of beneficial interconnection may rise further as more potential projects are assessed later this year.

The Government recognises that there are constraints in the supply chain for cable manufacture, and that this creates an opportunity for business in the UK, given the strong pipeline of interconnectors and offshore wind links.

Annual Monitoring Report Update (2018)

The existing regulatory regime is continuing to support a healthy pipeline of interconnection projects which will deliver significant benefits to UK consumers. By the early 2020s, the UK will now have well over 8 Gigawatts (GW) of capacity and there are many more projects with regulatory approval.

Four projects are currently under construction:

- 1GW to Belgium (Nemo Link), due for completion in 2019;
- 1.4GW to Norway (NSL), due for completion in 2021; and
- Two 1GW projects to France (IFA2 and ElecLink), both due for completion in 2020.

In addition, three more projects have recently received regulatory approval from Ofgem:

- 1.4GW to Denmark (VikingLink);
- 1.4GW to France (FAB Link); and
- 500MW to Ireland (GreenLink).

A new merchant project (i.e. not using the cap and floor regime) has also applied to Ofgem for regulatory approval:

- 2GW to France (Aquind).

In January 2018, Ofgem also granted initial regulatory approval for three new interconnectors to Norway, France and Germany under the cap and floor regime:

- 1.4GW to Norway (NorthConnect);
- 1.4GW to France (GridLink); and
- 1.4GW to Germany (NeuConnect).

Ofgem's assessment of these projects is that they could deliver around £10 billion of consumer benefits over 25 years. A full list of interconnector projects and their estimated delivery date is shown in the appendix.

In the context of UK's ongoing negotiations on its withdrawal from the EU – and the UK's future relationship with the EU Internal Energy Market – there is potential for the delivery of some interconnector projects to be delayed. It will be important therefore for the Government to work with connecting countries to ensure that any impact on the interconnector pipeline is minimised.

The Commission continues to believe that interconnectors will form an essential part of the future energy system and welcomes recent efforts to pursue additional interconnectors with other European countries. It will be important for the Government to work with connecting countries to minimise any impact on the interconnector pipeline of the UK's ongoing negotiations on its withdrawal from the EU.

Recommendation 2

The UK should become a world leader in electricity storage systems. Two steps are required:

- DECC and Ofgem should review the regulatory and legal status of storage and remove outdated barriers to enable storage to compete fairly with generation across the various interlinked electricity markets. The reforms should be proposed by Spring 2017 and implemented as soon as possible thereafter.
- Network owners should be incentivised by Ofgem to use storage (and other sources of flexibility) to improve the capacity and resilience of their networks as part of a more actively managed system.

Government Response (April 2016)

The Government welcomes the commission's recommendation on storage and agrees that storage has the potential to deliver a more secure and cost efficient energy system. Storage can perform many different roles in the energy system and this can lead to complexity in commercial as well as regulatory arrangements. Wherever possible, the Government wants storage technologies to compete with each other and with other providers of flexibility to drive down Costs in the energy system:

- The Government will implement the commission's recommendation and will work with Ofgem to deliver greater regulatory and legal clarity for storage. DECC and Ofgem will publish a call for evidence on a smart systems route map shortly and will set out proposals for reform by spring 2017.
- Ofgem's RII¹ framework for regulating network companies, and in particular incentives on efficiency and innovation, provide the basis for network companies to trial new technologies or ways of working and to adopt those which will benefit consumers. Ofgem will monitor these incentives to ensure that they allow network companies to use flexibility efficiently to defer or avoid investments, support cheaper and more timely connections, or to better manage issues on their networks.

Annual Monitoring Report Update (2018)

a)

Although it did not meet the spring 2017 deadline set out in its response to the *Smart Power* report, the Government did publish a comprehensive Smart Systems and Flexibility Plan (SSFP) in July 2017 setting out 29 actions it intends to take, alongside Ofgem and industry, to remove barriers to smart technologies such as storage and demand flexibility; to improve access to energy markets for new technologies and business models; and to enable smart homes and businesses.²

In order to implement the plan, as well as to consider wider issues across the electricity network, the Government and Ofgem have established a co-chaired stakeholder group known as the Smart Systems Forum, which meets regularly to discuss progress in implementing the various actions identified in the SSFP. Early evidence suggests this is proving an effective forum for identifying and removing barriers to smart technologies.

In October 2017, Ofgem published two consultations aimed at removing barriers to storage technology: one clarifying the ownership rules applied to network operators, the other on modifying the generation license for storage.^{3,4}

The Government has also confirmed that it will use primary legislation, when parliamentary time allows, to amend the Electricity Act 1989 to explicitly define electricity storage as a distinct subset of generation. This change, and the proposed license modification by Ofgem, are important steps to improve regulatory certainty for storage.

The Commission intends to monitor these changes over the coming year to ensure they are providing the necessary regulatory certainty to storage facilities and are enabling storage to compete fairly with other sources of flexibility.

The Commission welcomes the regulatory changes and clarifications that both Government and Ofgem have provided on flexible storage technologies. Given the importance of flexibility to the future energy system, the implementation of the Smart Systems and Flexibility Plan should remain an ongoing priority and its impact should be monitored. The Commission believes that Parliamentary time should be made available at the earliest opportunity to amend the Electricity Act 1989.

b)

The Commission recognises that some network owners have already started to invest in storage and other sources of flexibility to better manage their networks. Several distribution network operators (DNOs) have recently procured competitive flexibility services as an alternative to more traditional network investment; UK Power Networks, for example, recently issued a public tender for flexibility services for up to 35.4 Megawatts (MW) of services across ten locations to accommodate peaks of demand.⁵ The Commission welcomes these developments but continues to believe that more widespread roll-out will be needed to fully realise the network benefits of storage technologies.

Alongside the ongoing work of the Energy Networks Association – which is examining how DNOs could make more efficient use of new technologies – Ofgem’s *Revenue = Incentives, Innovation and Outputs* (RIIO) framework continues to provide the basis for network companies to trial new technologies.⁶ Ofgem is currently considering its framework for the next price controls for network companies, known as RIIO-2.

The Commission encourages Ofgem, as part of the development of the RIIO-2 Framework, to consider how network owners could be further incentivised to use storage and other sources of flexibility to improve the capacity and resilience of their networks as part of a more actively managed system.

Recommendation 3

The UK should make full use of demand flexibility by improving regulation, informing the public of its benefits it can provide and piloting business models.

- a) Ofgem should start an immediate review of the regulations and commercial arrangements surrounding demand flexibility with a focus on making participation easier and clarifying the role of aggregators; this should be complete by Spring 2017.
- b) DECC should make future changes to the capacity market to reduce the costs and barriers to entry for demand flexibility.
- c) DECC, Ofgem and National Grid should ensure that large users and opinion formers are aware of the money saving opportunities that demand flexibility can offer and encourage more industrial and commercial consumers to take part.
- d) Pilots focusing on business models which make demand flexibility easy and attractive to consumers should be established and fully evaluated. Government should demonstrate best practice by investigating the scope for demand flexibility on its estate.

Government Response (April 2016)

The Government welcomes the commission's recommendation on demand flexibility, agreeing that demand flexibility has the potential to deliver a more secure and cost efficient energy system.

- a) As part of their joint work with DECC, Ofgem will clarify the role of aggregators,⁷ reviewing relevant regulations and commercial arrangements that are in place. Options for enabling greater participation of aggregators will be tested through the forthcoming call for evidence on a smart systems route map. This will help to complete the review by Spring 2017.
- b) Views on process changes to the capacity market will also be sought through the call for evidence, where changes could be made in the short term to reduce administrative and cost barriers. DECC will also monitor how the capacity market might need to evolve over time, with a full review taking place in 2019.
- c) DECC and Ofgem are fully supportive of National Grid's Power Responsive campaign, aiming to raise awareness of the opportunities from demand flexibility amongst larger users. DECC and Ofgem are also exploring, through stakeholder engagement, how to further support greater participation of large industrial and commercial customers in the provision of flexibility. DECC and Ofgem will gather further information on what more needs to be done through the call for evidence, in order to take forward this recommendation.
- d) DECC will explore how, through innovation funding, pilots focused on demand flexibility could be best supported, with full evaluation of results. Following the Commission's report, the Government will allocate at least £50 million for innovation in energy storage, demand-side response and other smart technologies over the next five years to help new technologies and business models develop to the point where they can compete in the

market. In addition to this, to maximise the delivery of genuinely innovative projects and technologies, Ofgem will consult later this year on the future of the Network Innovation Competition (currently worth £100 million annually for gas and electricity) to better enable network innovation by non-licensed companies from 2017.

The Government is providing demand flexibility from the Government estate and will investigate ways to maximise this potential. For instance, Government is investigating the potential for installing battery storage alongside solar panels on various sites.

Annual Monitoring Report Update (2018)

a)

Alongside the publication of the Smart Systems and Flexibility Plan in July 2017, Ofgem issued a letter setting out its views to guide industry thinking on how it should deliver fair and efficient access to energy markets for independent aggregators.⁸

In line with the recommendations of the Commission's *Smart Power* report, Ofgem acknowledged that changes to existing industry codes such as the Balancing and Settlement Code (BSC) would be necessary for independent aggregators to access the Balancing Mechanism and wholesale electricity market. In the first instance, Ofgem considered that industry itself should propose modifications to the BSC to achieve the desired opening up of markets. Early signs indicate that this approach is being met with a positive response from market participants.

The Government has also committed to protect consumers from the risks of participating in a smart energy system, and has supported the introduction of a voluntary code of conduct for aggregators. The Association for Decentralised Energy has led the development of this code, which is expected to allow customers to compare different products and see which providers are meeting agreed standards. A further consultation on the draft code was launched in 2017, with a final scheme expected to be published in 2018.⁹

The Commission acknowledges the recent steps taken by Government and Ofgem to enable aggregators, including independent aggregators, to access additional energy markets. The Commission looks forward to the forthcoming launch of a Code of Conduct for aggregators, which aims to provide consumers with greater confidence about the service they receive from aggregators. In both cases, it will be important for Government and Ofgem to ensure that regulations remain fit for purpose and that voluntary agreements are providing the necessary protections to consumers.

b)

The Smart Systems and Flexibility Plan confirmed the Government's intention to remove barriers to the participation of demand flexibility in the Capacity Market. The plan included a commitment to enable asset reallocation by demand-side response providers, and allow the stacking of revenues between the Capacity Market and ancillary services.

The Government has already sought to allow greater stacking of revenue in the Capacity Market, for example by allowing the stacking of both enhanced frequency response (EFR) and Capacity Market revenues.

The Commission acknowledges that greater volumes of demand flexibility have come forward in recent Capacity Market auctions, with 1.4 Gigawatts (GW) of demand flexibility contracted in the December 2016 Capacity Market auction and a further 300 Megawatts (MW) contracted in the March 2017 Transitional Arrangements auction. The Commission will continue to monitor the Government's progress on this issue in future auctions.

The Commission welcomes the initial steps that have been taken to place storage and demand flexibility on a level playing field with other technologies in the Capacity Market. It will be important that Government and Ofgem continue to engage with industry representatives to enable these technologies to participate fully in the Capacity Market, reducing costs and removing any emerging barriers to entry for demand flexibility. More generally, a process of continuous monitoring will be required if the full benefits of demand flexibility are to be realised over the coming years.

c)

The Smart Systems and Flexibility Plan acknowledged a number of barriers to increasing the uptake of demand flexibility, including lack of awareness, complexity and difficulties in accessing markets to increase commercial incentives.¹⁰

In the short term, the Government and Ofgem have continued to support the Power Responsive campaign, a stakeholder-led programme facilitated by National Grid, which aims to increase participation of large non-domestic consumers in demand side response (DSR).

This ongoing work is expected to remove barriers to participation by providing greater access to smart solutions and distributed resources, in turn bringing costs down across the electricity system.

Since the programme began in 2015, total spend on demand flexibility has increased from £46 million in 2015/16 (equivalent to 16% of the total spend on Balancing Services) to over £53 million in 2016/17 (representing 20% of total spend).¹¹ National Grid also reports that in the last six months, on average across monthly tenders, demand side flexibility providers have made up 43% of accepted tenders in Firm Frequency Response (a rapid acting service to balance the electricity system).¹²

The Commission supports the aims of the Power Responsive campaign and welcomes the increasing role that demand flexibility is playing in the GB electricity market. The Commission encourages Government and Ofgem to explore how further support could continue to encourage participation among large industrial and commercial customers in the provision of flexibility.

d)

The Government has launched a number of innovation competitions to date, including a £8.8 million competition for non-domestic smart energy management; a £7.5 million competition for innovative non-domestic demand-side response; and a £7.75 million competition for domestic demand-side response. The Commission looks forward to reviewing further details of these competitions over the coming months and recommends that business models which make demand flexibility easy and attractive to consumers are piloted as part of the process.

In respect of the Government and wider public sector estates, the Commission believes that further opportunities should be taken to demonstrate best practice. The publication of a revised national framework by the Crown Commercial Service in June 2017 advising public sector consumers how to access demand flexibility is a welcome first step. However, further action is now required to ensure the Government is maximising the potential for providing demand flexibility from its own estate.

The Commission encourages further action to pilot measures across the Government estate to manage demand flexibly and to implement these on a large scale, where they can be shown to deliver benefits for the public sector and the electricity system. Business models to promote demand flexibility should also be piloted through the Government’s innovation competitions.

Recommendation 4

The System Operator must create new markets that will allow open competition for the services it procures and ensure it keeps pace with the network it oversees.

- a) The creation of an entirely independent System Operator should not be treated as an immediate priority but should be kept under review in light of progress towards strengthening National Grid’s independence.
- b) Ofgem should consider how it encourages the System Operator to develop new markets to provide ancillary services which allow new technologies to participate more easily. The long-term goal must be for a more strategic and transparent approach to the procurement of ancillary services and more cost reflective charging.

Government Response (April 2016)

- a) The Government recognises the pivotal role National Grid has played as system operator in keeping the energy market working. As the system changes, it is important to ensure it is as secure, flexible and cost-effective as possible. There is a strong case for greater independence for the system operator to maximise the benefits of a more flexible market, and realise the potential of interconnection, storage, and demand flexibility. DECC is working alongside National Grid and Ofgem to consider how to reform the current system operator model to make it more flexible and independent.
- b) The Government agrees that the System Operator should continuously work to ensure that the ancillary services market is as competitive as possible and open to all market participants capable of providing the services. Over the summer Ofgem will consult on a revised system operator incentives scheme. As part of this review, Ofgem wants to consider ways to make the ancillary services market more transparent. The review will also aim to consider ways in which National Grid Electricity Transition (NGET) can be incentivised to be more innovative. This will be with the goal of increasing participation in the market for ancillary services from new entrants and new technologies. DECC and Ofgem have also been looking more broadly at the future roles of parties in network and system operation with a view to ensuring co-ordinated and efficient use of flexible resources on the system, including new technologies. This will form part of the forthcoming joint call for evidence.

Annual Monitoring Report Update (2018)

In January 2017, Ofgem, the Government and National Grid issued a joint statement setting out their intentions to create greater independence for the electricity system operator.¹³ At the same time, Ofgem published a consultation on future arrangements.

Ofgem has since confirmed that National Grid should proceed with plans to set up a new legally separate company to carry out its electricity system operator function, with an expectation that a new system operator company should be fully operational by April 2019.¹⁴ This reform requires that the new system operator company will have its own licence, separate staff and offices to other National Grid electricity subsidiary companies.

Separately, the Government and Ofgem have confirmed their support for the new approach being taken by National Grid – the electricity system operator – through its System Needs and Product Strategy. This strategy aims to provide a clearer picture of the types of balancing services the System Operator will need to buy in future to maintain secure and affordable electricity supplies. It also aims to ensure fair participation of new technologies and ancillary services, ensuring their participation in the electricity market is transparent and strategic.

The System Operator has indicated that it will trial alternative models, including real-time markets, for ancillary services in 2018. A number of other reforms are expected to follow over 2018 designed to support coordinated and efficient access to flexibility across the transmission and distribution interface.

The Commission recognises the continued priority the Government has given to strengthening the independence of the System Operator and acknowledges the early steps being taken by the System Operator to allow storage and demand flexibility to compete more easily in the ancillary services it procures. It will be important that Government and Ofgem continuously monitor the current approach to ensure that any remaining barriers in the market for ancillary services, particularly from new entrants and new technologies, are swiftly removed.

Recommendation 5

Enabling the transition to more actively managed local networks should be a Government priority. By Spring 2017 DECC and Ofgem should consult and set out how and under what timeframe this transition should best take place.

Government Response (April 2016)

The Government and Ofgem are committed to enabling more actively managed local networks, empowering Distribution Network Operators and other players to make the best use of low-carbon generation to deliver the best deal for consumers. DECC set out in the December 2015 publication 'Towards a smart energy system' the view that a smart network will form the backbone of a smart energy system. The transition is underway and active network management is starting to become part of business as usual approaches for Distribution Network Operators (DNOs). Ofgem will continue to monitor the regulatory framework to ensure it supports the efficient use of these approaches.

The Government has been working actively with industry, particularly through the Smart Grid Forum, to develop a common understanding of the value of a smarter and more flexible energy system, explore policy proposals and take stock of trials and initiatives, and will continue to do so over this year. Together with Ofgem, DECC plans to present a further assessment on the transition to more actively managed local networks in the forthcoming call for evidence and, in the Government response later in 2016, will set out how and under what timeframe this transition should best take place.

Annual Monitoring Report Update (2018)

As part of the transition to more actively managed local networks, Ofgem has begun to consider its framework for the next price controls for network companies running gas and electricity transmission and distribution networks, known as the RII02. This will consider how distribution network operators could be further incentivised to develop more actively managed local networks.

In their recently published Smart Systems and Flexibility Plan, the Government and Ofgem noted that “distribution network operators (DNOs) must make more efficient use of new technologies, providers and solutions, as part of their evolution to distribution system operators (DSOs). It is critical that DSOs, transmission owners (TOs) and the System Operator (SO) develop timely and appropriate reforms to the way they plan, operate and engage with one another and customers, in order to manage the networks more efficiently and minimise whole system costs.”¹⁵

In support of this aim the Energy Networks Association (ENA) – which represents the companies that operate and maintain the gas and electricity grid network in the UK and Ireland – has established an Open Networks Project to develop a more detailed view of the changes that will be necessary to support DNOs transition from simply distributing electricity to playing a more active role managing supply and demand locally.

In December 2017, the ENA’s Open Networks Project published a comprehensive report setting out the changes that will be required to support the evolution from traditional network operation to new DSO functions, as the energy system becomes smarter and more efficient.¹⁶

The report set out a roadmap to 2030 with a range of steps which network and system operators will need to take in the short (1-2 years), medium (3-5 years) and longer (6+ years) terms. The report acknowledges that the roadmap will evolve over time, particularly as market models are clarified, but provides a useful starting point from which DNOs can plan investments and market services accordingly.

Several DNOs have already procured competitive flexibility services as an alternative to traditional network investment; UK Power Networks, for example, recently issued a public tender for flexibility services for up to 35.4 Megawatts across ten locations to accommodate peaks of demand.

The Commission welcomes the recent work carried out by the Energy Networks Association (ENA) to understand the practical steps involved in the transition from DNOs to DSOs. It will be important that short term measures identified in the ENA’s ‘DSO Transition Roadmap’ are taken forward. The Government and Ofgem should continue to monitor and engage with the work of the ENA to ensure that the overall approach is as efficient as possible for consumers and effective for the wider

energy system. The Commission looks forward to the development of the RIIO-2 Framework, which presents a further opportunity to incentivise the development of more actively managed local networks by DNOs.

Recommendation 6

Where upgrades to our networks are needed Ofgem should continue its work in encouraging network companies to make long term strategic decisions. Whilst this does increase the risk of stranded assets the Commission believes that if there is a potential net gain to future consumers then this approach may be justified. If network owners are not best placed to manage this risk they should work with third parties to help facilitate these investments.

Government Response (April 2016)

The Government agrees that this is an area that should be explored and has been engaging with Ofgem, network companies, and other stakeholders. Ofgem consulted on this issue last year and invited DNOs and other stakeholders to come forward with trials that might enable reinforcement to take place in anticipation of future connection customer requirements.

Ofgem is continuing to work through each trial with individual DNOs and stakeholders to establish whether the schemes are currently permissible, identify any regulatory issues, and judge whether there might be any unintended impacts on competition in connections. It plans to publish periodic updates on a trial-by-trial basis to share learning. Ofgem recognises that new schemes or trials may emerge in the future and has invited stakeholders to bring these forward when appropriate.

Annual Monitoring Report Update (2018)

In its February 2017 publication *Unlocking the Capacity of the Electricity Networks*, Ofgem presented an update on the status of constraints across the distribution and transmission networks and the changing interactions between them.¹⁷ It detailed a range of approaches being taken by DNOs to consider longer term network planning. Ofgem highlighted Western Power Distribution's publication of possible strategic network investment requirements to 2030 based on various generation and demand scenarios for its DNO regions.

More broadly, Ofgem continues to stress the importance of robust and coordinated network planning to ensure that DNOs are prepared for changing demand for use of their networks.

Progress has been made on a number of trials brought forward by DNOs since the publication of the Commission's *Smart Power* report: SSE Networks has worked with a consortium of developers in Scotland to fund network reinforcement which otherwise would not have progressed; Western Power Distribution has proposed a derogation from a connection charging rule to allow funding for a network investment project to be shared between developers; and Scottish Power Energy Networks and UK Power Networks are both developing criteria with stakeholders that could be used to determine whether or not anticipatory investment should be undertaken. In the meantime, Ofgem remains open to suggestions for new schemes or trials in this area.

The Commission welcomes the steps taken to date by network companies to improve forecasting and planning and encourages them to continue working closely together to facilitate timely electricity connections for future consumers. Ofgem and Government should continue to support a programme of trials to ensure future customers can get connected as efficiently as possible and that costs are allocated to the right party, to the benefit of the overall system.

Transport for a World City (March 2016)

In October 2015, the Chancellor asked the Commission to advise the Government on the case for additional large scale transport infrastructure in the capital and its region.

Transport for a World City was published in March 2016. The Commission's central finding was that Crossrail 2 should be taken forward as a priority, with funding made available to develop the scheme with the aim of submitting a hybrid Bill by autumn 2019. This would enable Crossrail 2 to open in 2033.

An update on progress in implementing each recommendation is set out below.

Recommendation 1

Crossrail 2 should be taken forward as a priority with the aim of opening in 2033, subject to the recommendations below.

Government Response (April 2016)

The Government agrees that Crossrail 2 should be taken forward as a priority. £80 million will be provided from the Transport Development Fund which, alongside a contribution from London, will enable the full development of the Crossrail 2 scheme with a view to depositing a hybrid Bill within this Parliament, subject to delivery of the commission's more detailed recommendations and approval of a revised Business Case.

Annual Monitoring Report Update (2018)

In March 2017, Transport for London (TfL) submitted an updated Strategic Outline Business Case for Crossrail 2 to the Secretary of State for Transport. It sought to demonstrate how more than half the cost of the scheme could be met by London over time using existing funding mechanisms, including the Business Rate Supplement, Mayoral Community Infrastructure Levy, fares and over-station development.

Following submission of this business case the scheme was subject to an external review by the Infrastructure and Projects Authority. The review concluded that further work should be undertaken to improve the affordability of the scheme, with a view to increasing the percentage of the scheme's costs to be met by London funding streams during its construction.

Subsequently, the Mayor of London and the Secretary of State for Transport issued a joint statement on 24 July 2017 supporting the scheme and agreeing to examine ways to improve its affordability while maximising the key benefits of the scheme – with a view to London meeting half the costs of the project during construction.¹⁸

In response to this challenge a range of options were considered by TfL and its partners to phase costs and increase London's share of funding during construction. The Commission understands that the results of this work were submitted to the Department for Transport (DfT) in October 2017.

At the Autumn Budget 2017, the Government again recognised the need for investment in London’s infrastructure to support its growth, while announcing an independent review looking at the funding and financing options as well as ways to improve the affordability of the scheme. The Government considers that undertaking an independent review on the options to fund and finance Crossrail 2 will allow it to follow best practice and ensure the project delivers value for money. Concerns have been expressed by others, however, that this will lengthen the decision-making process and could delay the scheme from opening in 2033 as proposed in the Commission’s 2016 report.¹⁹ To minimise this risk, it will be important that both the Government and TfL engage actively with the independent review so that an agreed and stable position may be reached in a timely fashion.

The precise timescales and terms of reference of the review are yet to be confirmed, but the department anticipates it will be in a position to deliver its conclusions in 2018.

The Commission calls on Government to ensure the independent review of the funding and financing of Crossrail 2 is completed as soon as possible, with a view to setting out a firm timetable and funding proposal by the end of 2018. The next stage of consultation should follow to enable the introduction of a hybrid Bill later this Parliament, with the overall aim of opening Crossrail 2 in the early to mid-2030s.

Recommendation 2

Crossrail 2 should be at the heart of the new London Plan, alongside existing commitments to upgrades and other pieces of new infrastructure. Crossrail 2 should not, subject to affordability, prevent the development of other high value schemes, particularly where alternative funding mechanisms are available.

- London must continue to plan strategically for the period 2030-2050 through the next iteration of the London Plan. Crossrail 2 should be at the heart of this strategy and TfL’s wider programme of smaller scale interventions on the national rail, road, Underground and cycling networks in London should be integrated with it to complement and enhance its benefits.
- The London Plan should also include a detailed examination of the scope to deliver other strategic projects, such as further east London river crossings and the Bakerloo line extension, through alternative financing mechanisms. This should build on the precedents from the Silvertown Crossing and Northern line extension to Battersea/Nine Elms.

Government Response (April 2016)

The Government agree that Crossrail 2 should be central to London’s long-term investment plans. While the development of long-term plans is for Transport for London (TfL) and the Mayor, the Government agrees that they should continue to work up options to prioritise other high value schemes where these demonstrate value for money and are affordable within their funding envelope.

Annual Monitoring Report Update (2018)

Since the publication of the Commission's *Transport for a World City* report, Transport for London (TfL) has continued to work closely with the Greater London Authority (GLA) to ensure that the Mayor of London's new London Plan provides the necessary strategic planning framework to support the delivery of growth associated with Crossrail 2.

A draft London Plan was published for consultation in November 2017 and is expected to be adopted in autumn 2019 following an Examination in Public.²⁰ Once adopted, the plan will cover a period up to 2041, with Crossrail 2 provisionally scheduled to open roughly mid-way through the period. The capacity and connectivity improvements that Crossrail 2 and other strategic transport projects offer, as well as the improved development viability they unlock, have been reflected in the draft London Plan in several ways. These include:

- **identifying 'Growth Corridors' for Crossrail 2 and other schemes:** The draft London Plan identifies a series of 'Growth Corridors' – clusters of Opportunity Areas – centred around major transport schemes where a significant proportion of London's growth is expected to be delivered. Crossrail 2 'North' and Crossrail 2 'South' corridors each contain a series of Opportunity Areas for which bespoke planning frameworks are expected to be developed to identify and plan for growth. In taking forward Opportunity Areas there is also a requirement for the relevant London borough to review development capacity in light of Crossrail 2's transport benefits.
- **optimising land use and densities around Crossrail 2:** The draft London Plan requires that development densities and land uses are optimised in line with emerging public transport schemes. This includes an expectation that over time development responds to the uplift in transport connectivity and capacity that Crossrail 2, and other schemes, will bring to individual sites.
- **managing industrial land:** Whilst aspiring to 'no net loss' of industrial floor space across London, the draft Plan encourages boroughs to adopt plan-led approaches which also consider opportunities for the consolidation, co-location (for example, of industrial and residential uses) and substitution of industrial land to unlock growth in areas well served by public transport. This will help ensure that growth arising from Crossrail 2 in Opportunity Areas is supported.
- **Strategic Housing Land Availability Assessment (SHLAA):** Supporting the London Plan, the new SHLAA identifies the land available to meet London's housing need. It shows how London can largely meet its housing need to 2029, but that additional capacity will be needed during and beyond the 2030s. The SHLAA contains a 'with Crossrail 2' scenario demonstrating the project's role in unlocking additional housing capacity to help meet long term need, through its support for higher densities, land use change and improved development viability.

The Commission welcomes the publication of the Mayor's draft London Plan and recognises the progress that TfL and the GLA have made in developing planning policies and strategies that will help to ensure development is phased, wherever possible, in line with the increased transport connectivity and capacity improvements that Crossrail 2 will bring. However, the greatest growth potential of the scheme is likely to be beyond the initial 10-year housing target period of the draft London Plan.

Recommendation 3

Sufficient development funds should be released in order for TfL and DfT to submit a revised business case for Crossrail 2 by March 2017 and the aim to introduce a hybrid Bill by autumn 2019. The revised business case should include developed plans on costs, funding, housing and stations. TfL estimates the overall development cost at c.£160 million, to which TfL should be expected to make a reasonable contribution.

Government Response (April 2016)

The Government agrees to make funds available for the development of the scheme by TfL and the Department for Transport (DfT). £80 million will be provided from the Transport Development Fund, which will fund half of the estimated costs of developing the Crossrail 2 scheme with a view to revising the business case by March 2017 and depositing a hybrid Bill within this Parliament. The Government expects TfL to match this commitment.

Annual Monitoring Report Update (2018)

At Budget 2016, the Government provided £80 million to support the development of Crossrail 2 with the aim of depositing a hybrid Bill within that Parliament. TfL matched the Government's £80 million commitment in development funding, giving the project a total of £160 million to develop a hybrid Bill.

Following the General Election in 2017, options for revised schedules have now emerged for submitting a hybrid Bill within the current Parliament which, under the *Fixed-term Parliaments Act 2011*, stretches to 2022.

The Commission understands that TfL has procured the professional services and resources necessary to develop a hybrid Bill in partnership with the DfT, who jointly sponsor the scheme. It will be important that the scheme is delivered as quickly as possible once a decision is made by Government to proceed.

The Commission welcomes the £80 million funding the Government has provided to support the development of Crossrail 2 and acknowledges the steps that have been taken to ensure the scheme can proceed as quickly as possible once they independent review is complete. The Commission remains concerned, however, that the longer it takes to reach a decision on the business case and timetable for depositing a hybrid Bill, the greater the risk that additional funding may be required to complete all the necessary work.

Recommendation 4

In developing the business case, it is crucial that TfL and DfT identify clear proposals to maximise its benefits and increase deliverability. The costs of Crossrail 2 are high and therefore every opportunity should be taken to improve its affordability.

- The updated case should include detailed options to reduce and phase the costs of the scheme. The most promising option identified to enhance affordability would be to delay the construction of the north-western branch to New Southgate. This could reduce the costs of the initial scheme in the 2020s by around £4 Billion. More work should also be done on the costs and benefits of individual central London stations.
- If construction of the north-western branch is delayed, this would also provide the opportunity to consider the case for an eastern branch from Hackney as an alternative.

Government Response (April 2016)

The Government is clear that work to maximise value for money on the project and reduce costs is crucial. The Government fully agrees that further work must be done, through revision of the business case, to reduce cost. This should identify specific options for reducing the overall cost of the project by at least £4 Billion. As the Commission has set out, the Government agrees that as part of this work there may be a strong case for deferring the construction of the north-western branch to New Southgate. The Government also expects a thorough review of the costs and benefits of each of the proposed London stations to determine the opportunity for further costs savings, including examining the case for the removal of stations.

Annual Monitoring Report Update (2018)

The Commission understands that a range of options have been considered to reduce the overall costs of the scheme since the publication of the Commission's *Transport for a World City*, including a review of station options along the proposed route together with further planning and engineering work. Since submitting its Strategic Outline Business Case, the Commission also understands that TfL has continued to examine a range of options to phase construction, which would see most of the railway operating in the early to mid-2030s, as originally envisaged. These options will now be considered alongside other work as part of the independent review of the funding, financing and affordability announced at Autumn Budget 2017.

The Commission welcomes the work that has been carried out to date to reduce the overall costs of the scheme and notes this will be subject to independent review over the coming months. The Commission continues to believe that deferring the construction of the north-western branch to New Southgate offers an opportunity to improve the overall affordability of the scheme.

Recommendation 5

A 'London deal for Crossrail 2' funding agreement, through which London contributes more than half the costs of the scheme and which includes substantial measures to realise the full housing benefits, should be agreed ahead of hybrid Bill submission.

- It is vital that a funding package for Crossrail 2 is developed which strikes a fair balance between the contributions made by London taxpayers and businesses and by central Government. This should build on the work already undertaken by TfL, which indicated that around half the cost of the project could be funded from London sources.
- The Government should work with TfL and GLA to explore new funding options, which could include consideration of further devolution. However, even without such devolution, HM Treasury should be able to recoup significant receipts from the added Gross Value Added (GVA) benefits and the rising value of property in London.
- A London deal for Crossrail 2 will need to cover both the funding of the project and the planning measures required to deliver Crossrail 2's benefits.

Government Response (April 2016)

The Government agrees that a funding package should be determined with London that finds the right balance between contributions from Londoners and from central Government. The Government agrees with the commission's recommendation that London should fund more than half of the project, and will work with TfL and the Greater London Authority (GLA) to explore new funding options based on locally raised revenue. The Government agrees that this funding package needs to be in place before a hybrid Bill could be submitted.

The Government will work with TfL, the Mayor and the GLA to unlock the housing potential of Crossrail 2.

Annual Monitoring Report Update (2018)

The Commission understands that TfL has now submitted a proposal to the Government seeking to demonstrate how London could fund half the costs of Crossrail 2 during construction. The Government is currently considering this proposal and has announced an independent review of the funding, financing and affordability of Crossrail 2.²¹ It will be important that TfL and the Government engage actively with the review so it can carry out its work quickly and efficiently.

In the meantime, the GLA has consulted on proposals for a new Mayoral Community Infrastructure Levy – known as Mayoral CIL2 – to contribute towards the funding of Crossrail 2.²²

In the 2016 Budget, the Government also invited TfL to put forward proposals for how land value increases that arise because of transport investment could be captured to pay for the transport infrastructure. In response, TfL prepared a land value capture report, published in February 2017, in the form of a working paper to the London Finance Commission.²³ The report discussed four possible mechanisms for capturing land value.

Following a Memorandum of Understanding on further devolution to London, the Government established a taskforce, including representatives from both London and central Government, to investigate possible land value capture mechanisms and the potential for a pilot application in London.²⁴ The Commission understands these mechanisms could potentially be tested on the Crossrail 2 route alongside other major infrastructure projects in London.

While the Commission acknowledges the challenges of funding and financing a project of this scale, it is nonetheless disappointed at the delay caused by the decision to undertake an independent review. It will therefore be crucial that the review enables a clear position to be reached quickly on Government funding such that a timetable and funding proposal can be agreed by the end of 2018.

The Commission welcomes the wider work that TfL, the GLA and Government are undertaking to explore the potential for new funding options to support Crossrail 2. In addition, the Commission recommends that TfL and the Government should explore how the scope of any future hybrid Bill could optimise the scheme and its benefits, for example by including powers to support the wider regeneration associated with the scheme.

Recommendation 6

TfL and DfT in conjunction with other Government departments and relevant bodies, should use the next stage of development to set out a clear, transformative plan to turn the proposed 200,000 homes into a reality.

- Strong measures to maximise the new housing enabled by the scheme should be included in the 'London deal for Crossrail 2'—this could include the establishment of one or more development corporations to lead the master planning and delivery of new housing and urban realm provision, and revised planning guidance for the whole route. These measures should be considered as a potential model for improving housing delivery more widely.
- For housing provision to be a success across the whole route, the London deal for Crossrail 2 will need to have buy-in from the GLA and London boroughs along the route as well as counties and boroughs outside of London which benefit from the new line. All parties will need to ensure the housing unlocked by Crossrail 2 is sustainable and meets the needs of Londoners and those in commuter regions around London.

Government Response (April 2016)

The Government agrees that fully realising the benefits of Crossrail 2 will require the commitment of central Government, the GLA, the Mayor and local authorities to identify ways to deliver 200,000 homes. The Government will work closely with the other parties to develop an agreed approach to unlocking this housing potential.

Annual Monitoring Report Update (2018)

The Commission understands that TfL has considered several detailed approaches in its Strategic Outline Business Case (SOBC) on how the wider housing benefits associated with Crossrail 2 could be delivered, including through the development of new homes above and around new stations. It is likely that any new development above stations would also help fund the project.

The extent to which detailed housing plans can be publicly evaluated is limited, due in part to uncertainty over the route and associated safeguarding which remains. Notwithstanding these constraints, the GLA and TfL report that several changes in housing policy and practice have occurred since the submission of the SOBC which will support the delivery of homes across the Crossrail 2 corridor. These include:

- the publication of a draft Housing Strategy, draft Mayor's Transport Strategy and draft London Plan which have placed an increased emphasis on the role of transport in unlocking development;
- the draft Housing Strategy, in particular, sets out an increased role in delivering homes through using statutory powers to secure land for new and affordable homes;
- the establishment of a dedicated land fund (c.£250 million) to support a more proactive stance on land acquisition and intervention to facilitate housing delivery, alongside a programme of research to investigate what further measure may be necessary to support a more proactive approach to land assembly; and
- ongoing work through a land value capture Taskforce and other fora to examine how land value uplift created by public sector investment in major infrastructure projects could be captured and used to fund the infrastructure that helped create the increase in value.

The Commission welcomes recent changes in housing policy and practice that will help to support the delivery of new homes across the Crossrail 2 corridor. The Commission reiterates its call for the Government to commit to a timescale and funding proposal for Crossrail 2 by the end of 2018 to provide greater certainty about housing delivery and, following agreement of the route, to facilitate the safeguarding necessary to secure the wider benefits of the scheme.

In line with the Mayor's commitment to take a more interventionist approach in London's land market, the Commission encourages the Mayor and the GLA to consider the establishment of one or more development corporations to lead the master planning and delivery of new housing and urban realm provision.

Recommendation 7

The opportunity should be taken to maximise private sector involvement in the development and funding of stations and their surrounding areas.

- TfL and DfT should leverage private sector capital and expertise to develop selected Crossrail 2 stations, including both the stations themselves and the surrounding land. Development could also be supported by land purchase powers and the ability to assemble sites.

Government Response (April 2016)

The Government agrees that where possible the private sector should be involved in the development and funding of stations and their surrounding areas. DfT and TfL should work together to identify opportunities for leveraging private sector funding as has been achieved on the Elizabeth Line (formerly known as Crossrail 1).

Annual Monitoring Report Update (2018)

The Commission understands that the Mayor of London and the Government are continuing to examine how the private sector could be involved in the development and funding of Crossrail 2 stations and their surrounding areas.

The Commission also understands that the GLA and TfL have the necessary systems, frameworks and expertise in place to enable the establishment of any property vehicles or other holding arrangements which could potentially be used to support the development of stations and their surrounding areas.

The Commission notes that TfL is already using several routes to develop its existing sites, including through its property partnerships framework of developers, direct-development and site-specific partnerships. These could provide models for the development of future sites.

Separately, the Commission understands that work is ongoing to explore how value could be extracted from a 'zone of influence' surrounding each station.

The Commission welcomes the early work that has been undertaken to examine the potential for private sector involvement in the development of stations and their surrounding areas. It will be important as the scheme progresses that TfL and DfT work closely with London boroughs and adjoining counties to ensure their support for any future hybrid Bill in respect of any identified zones of influence.

Recommendation 8

Following the submission of a revised business case and agreement on the conditions above, the aim should be for a hybrid Bill to be submitted by autumn 2019 – the first step towards the railway opening in 2033. As a result:

- submission of a Bill in 2019 would allow significant progress to be made on the passage of a Bill before the end of this Parliament
- completion of the project in 2033 would allow the project to open in time for the planned arrival of HS2 phase 2 at Euston.

Government Response (April 2016)

The Government accepts the recommendations on the hybrid Bill, subject to Parliamentary time allowing, which would place the project on course to open in 2033. However, the Government notes the report's finding that as joint sponsors of Crossrail 2, DfT and TfL will need to undertake an extensive programme of work if this aim is to be met. In the first year this includes review of the Crossrail 2 business case, including further strengthening of strategic alternatives, and robust appraisal of scheme costs, all of which the Government fully accepts.

Annual Monitoring Report Update (2018)

The 2017 General Election has now resulted in a revised window for submitting a hybrid Bill within the current Parliament.

The Commission continues to believe that it will be important for the majority of the railway – and in particular the Central Operating Section – to be complete by the early 2030s, to allow the project to meet rising passenger demand across the capital. TfL's modelling indicates that without Crossrail 2, and assuming London continues to grow, serious crowding and regular station closures would result at 17 central London stations including Euston, Victoria, Clapham Junction and Waterloo.

It will be important that time is made available in Parliament to consider major housing and infrastructure schemes such as Crossrail 2 given the substantial benefits and investment potential they will bring to the UK economy.

The Commission calls on Government, following completion of the independent review, to commit to a clear timetable for the deposit of a hybrid Bill that would enable Crossrail 2 to start operating in the early to mid-2030s. To meet this objective a second reading of the Bill would need to take place this Parliament.

High Speed North (March 2016)

In October 2015, the Chancellor asked the Commission to carry out a study into the long term inter-urban transport needs of the north of England, drawing upon Transport for Northern England (TfN's) developing plan to radically improve connectivity between northern cities, including potentially through high speed lines.

High Speed North was published in March 2016. Its central finding was that Northern England transport networks needed both significant short-term investment, and a plan for longer-term transformation to reduce journey times, increase capacity and improve reliability.

An update on progress in implementing each recommendation is set out below.

Recommendation 1

Improving connectivity between the cities of Northern England will not be sufficient to create the northern powerhouse, but is necessary. Transformations in transport connectivity should form part of a broader strategy incorporating improvements in education, workforce training, research and innovation, spatial planning and wider infrastructure investment.

Government Response (April 2016)

The Government agrees that transformations in transport connectivity should form part of a broader strategy for building a Northern Powerhouse. At the 2015 Spending Review the Government announced a major package totalling over £200 Billion with investment in business, innovation, health, agriculture and culture as well as transport across Northern England. The Government is also delivering radical devolution of powers across the region; powerful elected mayors have now been agreed for over half of Northern England population. This process is not complete: the Government remains committed to devolving powers throughout this Parliament.

In addition, building on the strong progress made through Transport for the North (TfN), at Budget 2016 the Government and Northern England major cities made a joint statement of intent to expand the focus to look at skills and employment, trade and investment, enterprise and innovation, and housing. This work will build on the Independent Economic Review commissioned by TfN, which has shown that enhancing transport connectivity is a crucial element of delivering the Northern Powerhouse, but it is not sufficient on its own.

Since the publication of the Commission's *High Speed North* report, several devolution deals have been negotiated between the Government and local areas. These are leading to a range of positive developments including the establishment of local skills and employment strategies.

The election of six metro-mayors in 2017 – covering the West Midlands, Greater Manchester, Liverpool City Region, the West of England, the Tees Valley and Cambridgeshire and Peterborough – with distinct powers relating to economic development, planning and transport is a positive step. There is also likely to remain scope for more extensive devolution over time.

In November 2017, the six recently elected metro-mayors and the Mayor of London issued a joint statement calling for “a major and sustained programme of devolution to cities and regions”.²⁵ They identified skills, training, apprenticeship services and welfare to work programmes as areas where further devolution should be considered as a priority.

In its interim National Infrastructure Assessment (NIA), the Commission committed to work directly with metro mayors to support them in developing their own integrated and comprehensive infrastructure strategies.²⁶ Whilst transport planning is central to this work, the Commission is also aiming to take a broader perspective, encouraging metro mayors to consider the full spectrum of potential priorities for each city-region.

The recent work undertaken by Greater Manchester Combined Authority and its partners in developing a Growth Strategy for HS2 and Northern Powerhouse Rail provides a welcome model for incorporating wider improvements alongside transformations in transport connectivity. As part of this work, a skills strategy has been developed which aims to help residents access the job opportunities created by the construction of high speed rail infrastructure and the regeneration arising from it.

The Commission supports the devolution deals that have been negotiated between the Government and local areas and welcomes the opportunities that these have provided for considering improvements in skills, education, workforce training and other areas alongside wider transformations in transport connectivity. The Commission encourages the Government to consider long term funding arrangements to support the implementation of local growth strategies, particularly where these can be shown to compliment transport improvements.

Given the overlapping nature of recommendations 2 and 7, a single update has been provided below.

Recommendation 2

To connect northern cities faster and more reliably than today, the Commission recommends that funding be provided to further develop the long-term plan for HS3, which should be conceived as a high capacity rail network, rather than a single piece of entirely new infrastructure. This plan must be fully integrated with proposals for maximising the benefits from currently planned investments.

Government Response (April 2016)

The Government agrees that Northern England’s cities need connecting faster and more reliably than today. The Government has already committed £13 Billion of investment on transport in the North over this Parliament. At Budget 2016, the Government committed £60m for the development of plans for HS3 between Manchester and Leeds as well as Northern England other major cities.

The Department for Transport (DfT) will work with TfN to ensure that the plans are fully integrated with the significant investment already committed in the North, including the new Northern and TransPennine rail franchises and the TransPennine Route Upgrade. TfN has recently published its first annual update to the Northern Transport Strategy (March 2016) and the commission’s recommendations will be incorporated into its future work.

Recommendation 7

TfN should follow an approach that seeks to maximise the benefits of current and planned investments and integrates them with an ambitious longer-term plan, in developing and prioritising proposals for other major inter-city links through its Northern Powerhouse Rail strategy. This should include assessing the case and options for early enhancements to key routes and for improvement and redevelopment at gateway stations including Liverpool Lime Street.

Government Response (April 2016)

The Government agrees with the commission's recommendation. By 2017 TfN will have been established on a statutory basis and empowered to develop and drive forward transport plans which will support economic growth in the North. TfN recently published its first annual update to the Northern Transport Strategy. This set out how TfN is working with partners such as the DfT to deliver improvements in the short term and make progress on longer term projects. The commission's recommendation will be incorporated into this work.

Following the publication of the Commission's *High Speed North* report, Transport for the North (TfN) and the Department for Transport (DfT) have continued to develop the business case for Northern Powerhouse Rail (previously referred to as HS3).

In line with the Commission's original recommendation, rather than relying entirely on new infrastructure to transform connectivity between the major cities of Northern England, the Northern Powerhouse Rail (NPR) network seeks to maximise the benefits from currently planned investments such as High Speed 2 (HS2). To support this aim the Government has provided £300 million to develop the case for the Northern Powerhouse Rail and HS2 'touchpoints'.²⁷

In its recently published draft Strategic Transport Plan, TfN set out an emerging vision for the NPR network, which includes.²⁸

- a new line between Liverpool and the HS2 Manchester Spur via Warrington;
- capacity at Manchester Piccadilly for around eight through services per hour;
- a new Trans Pennine rail line that connects Manchester and Leeds via Bradford;
- significant upgrades along the corridor of the existing Hope Valley line between Sheffield and Manchester via Stockport;
- Leeds to Sheffield delivered through HS2 Phase 2B and upgrading the route from Sheffield;
- Leeds to Newcastle via HS2 junction and upgrades to the East Coast Mainline; and
- significant upgrades to existing line from Leeds to Hull (via Selby) and Sheffield to Hull (via Doncaster).

Transport for the North and DfT are also considering a range of alternative concepts to improve connectivity between these cities as part of the ongoing NPR development work. TfN and DfT will submit a Strategic Outline Business Case for the NPR network by the end of 2018.

Since TfN does not currently have the ability to borrow money or raise its own revenue, it will need to examine which of the NPR schemes can be delivered through existing investment programmes and which will require additional investment. The identification of key milestones in TfN's draft Strategic Transport Plan provides a good starting point from which to develop this work.

The Commission welcomes the ongoing work of TfN and the DfT in developing the business case for Northern Powerhouse Rail. Following the planned submission of a Strategic Outline Business Case, the Commission calls on the Government to provide clarity, before the end of 2018, on the timetable and funding envelope required to deliver the Northern Powerhouse Rail network.

Recommendation 3

TfN should work with the Department for Transport, Network Rail, HS2 Ltd and other stakeholders to prepare by the end of 2017 a single integrated strategy, combining short-term action with an ambitious long-term vision, which supports the overall plan for the HS3 network and brings together:

- The upgrade of the Trans-Pennine line between Manchester and Leeds.
- The design of the northern phase of the HS2 network, including connectivity between Leeds – Sheffield and Liverpool – Manchester.
- Proposals for the redevelopment of Manchester Piccadilly station.

Government Response (April 2016)

The Government accepts the commission's recommendation that a single integrated strategy should be prepared by the end of 2017. The Government is investing heavily in the transport infrastructure of the North. Projects such as HS2 Phase 2 and the Trans-Pennine Upgrade Project transform travel in the North over the years to come.

However, if the Northern Powerhouse is to be successful and the economic prospects of the North transformed, these projects must be considered together to achieve the best value for money. At Budget 2016 the Government committed £60 million to develop plans for HS3 between Manchester and Leeds and Northern England's other major city rail links.

The Government also committed HS2 Growth Strategy funding which will support the establishment of proposals for the redevelopment of Manchester Piccadilly station. DfT will work closely with TfN, HS2 Ltd and Network Rail and local Government partners to prepare an integrated strategy by the end of 2017 that will ensure the potential economic returns are maximised. At that point, the Government will seek further advice from the commission on the strategy that has been prepared.

In December 2017, Transport for the North (TfN) responded formally to the Commission, on behalf of the Northern Powerhouse Rail Programme Board, setting out its progress in implementing recommendation 3 of the Commission's *High Speed North* report.²⁹ This response confirmed the intention to focus on improving the Leeds – Manchester line as a first stage of a planned Northern Powerhouse Rail network.

In January 2018, Transport for the North (TfN) published a draft Strategic Transport Plan setting out its priorities for strategic road and rail investment across Northern England to 2050.³⁰ The document represents a significant milestone in the development of a single, shared vision among TfN's 19 constituent authorities.

The plan sets out a range of short term improvements to the road and rail network alongside longer term ambitions, including the construction of new rail lines between Liverpool – Manchester and Manchester – Leeds, and a partially tunnelled road following the line of the existing A628.

Following the approval of secondary legislation in Parliament, TfN will become the first Sub-National Transport Body in April 2018. Its final transport plan will then become a statutory document. TfN hopes to use its status as a statutory partner to the Secretary of State for Transport to further make the case for additional investment in both road and rail schemes in the region.

TfN has acknowledged that its plan will evolve over the coming years, alongside further consultation on individual programmes and projects. Nevertheless, in setting out shared priorities for future transport investment, the plan provides a welcome pipeline of projects around which there is political consensus in the region.

The Commission welcomes the forthcoming establishment of Transport for the North (TfN) as a Sub-National Transport Body and the recent publication of its draft Strategic Transport Plan, both of which will allow TfN and its partners to play a leading role in developing the case for investment in the Northern England, speaking with a unified voice to Government, and making the right transport decisions for the region.

Recommendation 4

The upgrade of the Leeds to Manchester link should form the first phase of HS3 to be developed in detail. It should comprise a long-term programme with the objective of reducing journey times to 30 minutes, alongside substantial capacity and frequency improvements. The first part of this should be a shorter-term plan, to be developed and implemented by TfN and Network Rail by 2022, to cut the journey time between these cities and to onward destinations by roughly 20% from 49 to 40 minutes, enhance capacity and improve service regularity and frequency.

Government Response (April 2016)

DfT, TfN and Network Rail are already taking forward the Trans-Pennine Route Upgrade which will reduce journey times between Manchester and Leeds to 40 minutes and deliver enhanced capacity, reliability and frequency by 2022. Building on this work and looking to the long term, DfT, TfN and Network Rail will work together to develop plans for HS3 between Manchester and Leeds by 2017 which aim to bring down journey times to around 30 minutes, drawing on the £60 million of funding that was committed at Budget 2016.

Leeds and Manchester are linked by five ‘fast’ trains per hour, although average speeds remain 51 mph or less, with the fastest available service taking 49 minutes. Where services have been improved in recent years there has been an increase in passenger usage, with the TransPennine Express franchise recording growth of over 18% over the period from 2011/12 to 2015/16.³¹ Crowding at peak times and weekends is now a regular occurrence.

To address these challenges the Department for Transport (DfT), Network Rail and Transport for the North (TfN) have been working together to agree a series of interventions in the short, medium and longer terms.

In the short term, increased passenger capacity will be provided through the introduction of new trains with substantially more seats as part of the new TransPennine Express franchise.

In the medium term, the Trans-Pennine route upgrade (TRU) is seeking to increase capacity and reduce journey times between York, Leeds and Manchester Victoria, through a range of potential infrastructure upgrades involving track improvements and the introduction of digital signalling and electrification.

The upgrade of the Trans-Pennine route has been under active consideration by Network Rail since 2011, and was originally due to be completed by 2019.³² After the programme was paused in mid-2015, a revised timetable was proposed in which Network Rail would carry out further option development work and report back to DfT before the end of 2017 with a target delivery date of passenger improvements from 2022.

Network Rail produced its report in December 2017. The Commission understands that among the options a target time of 40 minutes for fast trains from Leeds to Manchester is being considered. Network Rail is developing a phased approach towards delivery that will allow certain elements of work, which can be delivered within existing railway boundaries, to be delivered first. Other interventions which require more extensive powers are expected to follow later.

Concerns have been expressed that the line may not be fully electrified, following comments made by the Secretary of State for Transport in 2017 suggesting that bi-mode trains – capable of switching between diesel and electric mode – could be used on parts of the network where electrification is difficult, which could affect what journey times would be achievable.³³

DfT is currently considering its response to Network Rail’s options for upgrading the Trans-Pennine Route. An investment decision is expected in early 2018 with the target delivery date remaining December 2022.

In the longer term, TfN’s draft Strategic Transport Plan proposes the creation of a new rail line connecting Manchester and Leeds via Bradford as part of the Northern Powerhouse Rail scheme, with the aim of potentially reducing journey times between the two cities to 30 minutes. Detailed development and assessment of this proposal, alongside alternative options to deliver further improvements on this route, is underway as part of the work on the Strategic Outline Business Case for Northern Powerhouse Rail which is due to be completed by the end of 2018.

The Commission welcomes the interventions planned for the Leeds to Manchester route in the short, medium and longer terms, which will substantially improve the frequency, capacity and reliability of services between the two cities. By agreeing a long-term programme of improvements now, the Government and its partners can ensure that each intervention lays the ground for

future improvements. It will be important that the Government sticks to the agreed timetable for upgrading the Trans-Pennine Route and that the Government and TfN reach a shared view by the end of 2018 on the options for longer term improvements (including on the forward timetable and funding envelope) as part of the overall strategy for Northern Powerhouse Rail, so that development work and route planning can begin in earnest.

Recommendation 5

The design of the northern phase of HS2 should be taken forward by HS2 Ltd, working closely with TfN, to ensure that this is planned and delivered so as to facilitate the development of the HS3 network, enhancing connectivity between Leeds – Sheffield, Liverpool – Manchester (and its airport), and between Sheffield – Newcastle, as well as to onward destinations.

Government Response (April 2016)

The Government agrees that the northern phase of HS2 should be planned and delivered so as to facilitate the development of the HS3 network. HS2 Phase 2 provides an opportunity to not only transform north-south connectivity but also east-west connectivity in the North by reducing journey times and increasing capacity between the region's principal city regions. Ahead of announcements later this year on the route of HS2 Phase 2, DfT and HS2 Ltd will work with TfN to ensure that the future development of the HS3 network is considered.

The Commission welcomes effective joint working between the Government, HS2 Ltd and TfN to ensure that the northern phase of HS2 is planned and delivered to facilitate the development of Northern Powerhouse Rail (NPR) (previously referred to as 'HS3').

Emerging plans being developed by Transport for the North (TfN) would see sections of HS2 infrastructure being used to support its plans for NPR, including improved connections from Sheffield to Leeds and Liverpool to Manchester.³⁴ To enable this to happen, agreement has been secured to incorporate passive provision in the HS2 Phase 2B hybrid Bill at the key 'touchpoints' between HS2 and NPR, and £300 million of funding committed to complete the necessary works.³⁵ These include:

- junctions in the Leeds area, enabling trains from Manchester, Sheffield and the Midlands to travel via Leeds and on to York and the North East. This could also release capacity for more local and commuter services east of Leeds;
- junctions in Cheshire to serve Liverpool via a new line, enabling services between Liverpool and Manchester via the HS2 Manchester spur, and offering the potential for faster Liverpool – London HS2 services on to the HS2 mainline;
- junctions at Manchester Piccadilly, which combined with a range of other interventions, would enable services from Manchester Airport and Liverpool to continue east towards Leeds and the North East; and
- a junction north of Sheffield at Clayton, enabling trains to run through Sheffield and re-join the HS2 mainline to Leeds.

The Commission strongly supports the progress that Government, HS2 Ltd and TfN have made in integrating the northern phase of HS2 with the Northern Powerhouse Rail network. This work is an example of best practice and demonstrates how new infrastructure for one scheme can be used to support the development of a future, complementary programme. It is now vital that the necessary development work is completed in time to incorporate the necessary passive provision without delaying the HS2 Phase 2B hybrid Bill programme.

Recommendation 6

Proposals for the redevelopment of Manchester Piccadilly station should be prepared jointly by TfN, Transport for Greater Manchester (TfGM), Manchester City Council, Network Rail, DfT and HS2 Ltd. These organisations should work to together to deliver:

- detailed plans for the new east-west platforms 15/16 to facilitate delivery early in Control Period 6 and unlock the development potential of the Mayfield site;
- a masterplan for the longer-term development of Manchester Piccadilly station incorporating capacity for HS2 services and options for the delivery and timing of platform capacity for HS3; and
- proposals for funding and financing the station redevelopment, including for private sector and local contributions.

Government Response (April 2016)

The Government agrees that proposals for the redevelopment of Manchester Piccadilly Station should be progressed as a joint project to support an integrated long-term plan for use of the station, including opportunities for new services such as HS2 and HS3. TfN, Transport for Greater Manchester, Manchester City Council, Network Rail, DfT and HS2 Ltd are already working together to ensure that Manchester Piccadilly Station is ready for the arrival of transformational schemes such as HS2 and HS3.

To take forward the commission's recommendations, proposals for the redevelopment of Manchester Piccadilly will be worked up alongside and integrated with the development of plans by the end of 2017 for HS3 between Manchester and Leeds. To further support this work, at Budget 2016 the Government provided HS2 Growth Strategy funding for Manchester Piccadilly station (as well as Leeds and Manchester Airport stations).

This will support the production of a masterplan for the long-term development of the station and surrounding area. This work will include proposals for funding and financing of any proposed station redevelopment, including for significant private sector and local contributions. Such proposals should consider the affordability of the project and ways of striking an appropriate balance between the funding contributions from central Government and the local area. The Government would expect private sector and local contributions to fund around half of the costs of the project.

As part of its *High Speed North* study, the Commission explored a number of options for accommodating HS2 and Northern Powerhouse Rail (NPR) services (previously referred to as 'HS3') at Manchester Piccadilly station and maximising commercial opportunities for regeneration of the surrounding area.

In response, at Budget 2016, Government announced it would allocate £2.5 million of funding to take forward work on HS2 Growth Strategies for Manchester Piccadilly and Manchester Airport stations (£1.25 million per station). A Greater Manchester Growth Strategy has since been developed by Greater Manchester Combined Authority, Manchester City Council, Transport for Greater Manchester (TfGM) and others, which includes proposals for Piccadilly. This was submitted to the Government for consideration in December 2017.

Alongside this, detailed options development and appraisal work for redeveloping Piccadilly is still underway. A 'Manchester Piccadilly Joint Board' has been established comprising senior representatives from Network Rail, Manchester City Council, TfGM, DfT, HS2 Ltd and TfN to agree the long-term development strategy for the station.

This Board is overseeing the development of a jointly agreed vision for Piccadilly station and ensuring it is aligned with the development of the wider NPR network, which is considering the case for a fully integrated underground station at Piccadilly capable of accommodating up to 8 NPR services an hour.

Were a through station to require substantial changes to the scheme as set out in the hybrid Bill (for example, for an underground option) then such proposals would require an Additional Provision to the HS2 Phase 2b hybrid Bill to be prepared and deposited in 2020.

With a range of NPR Station options still under consideration by different partners, and substantial further work needed to test the viability and funding of any final scheme, it will be important to ensure that an agreed strategy is reached in time to enable the deposit of Additional Provision to the HS2 Phase 2b hybrid Bill, if required.

Platforms 15/16

In 2015, Network Rail applied for a Transport and Works Act Order which would enable the construction of two new 'through' platforms at Piccadilly (platforms 15 and 16). A public inquiry was held during Autumn 2015 and closed later that year. As at January 2018, Network Rail was still awaiting a decision from the Secretary of State for Transport on its application for the work.

Since the submission of its application, however, Network Rail has changed the timetable train planning rules so that more trains can operate in the corridor from May 2018, potentially obviating the need for additional platforms.

Manchester City Council and TfGM remain keen to ensure that the station is sufficiently futureproofed and able to cope with future demand arising from HS2 and Northern Powerhouse services. Discussions are currently ongoing with the Department for Transport and Network Rail to examine whether and when additional infrastructure might be required to support future demand.

The Commission welcomes the establishment of the Manchester Piccadilly Joint Board to provide advice on the development and implementation of a new scheme for Manchester Piccadilly station. It calls on the Government and other relevant stakeholders to work together to agree a preferred option for the redevelopment of Manchester Piccadilly as part of the overall NPR strategy, so that any Additional Provision to the HS2 phase 2b Bill can be developed without delay.

Recommendation 8

On the strategic road network, Highways England should accelerate capacity enhancements to the M62 between Liverpool and Manchester and between Manchester and Leeds. Very substantial capital funding should be brought forwards, so that both schemes can be accelerated, with work beginning between Liverpool and Manchester in Roads Investment Strategy year 2017/2018 – two years ahead of schedule – and work between Manchester and Leeds also significantly fast-tracked.

Government Response (April 2016)

The Government accepts the commission's recommendation and notes the commission's support for the smart motorway programme. The Government has provided £161 million of additional funding to allow work on the M62 schemes to be brought forward. This will mean that construction will begin on the M62 junctions 10-12 two years earlier in 2018 and finish in 2020. Work on the M62 junctions 20-25, from Rochdale to Huddersfield across the Pennines will also be accelerated so that construction begins in 2019, six months earlier than planned. This additional funding means that the benefits of increased capacity and journey reliability across the Pennines can be realised as quickly as possible.

The Commission finds that Highways England has made good progress with planned improvements to the M62 between Liverpool and Manchester and between Manchester and Leeds, and is currently on track to start construction in line with the Government's accelerated timescales.

M62 between Liverpool and Manchester (junctions 10-12)

Ahead of starting construction in March 2018, Highways England has carried out a range of surveys and assessments, alongside discussions with local authorities, technical stakeholders and the wider public, to inform the development of its final scheme. Once works are complete (expected by March 2020) this 9.8 mile section of the M62 will have been upgraded to an 'all-lane running' Smart Motorway, reducing congestion and making journeys more reliable.

M62 between Rochdale to Huddersfield (junctions 20-25)

Highways England is continuing to develop smart motorway design options for the M62 between junctions 20-25 that would see the existing hard shoulder converted into a traffic lane providing four lanes for traffic.

The preliminary design stage is underway and Highways England expects to move into the next stage of development by the end of September 2018. This will allow work to start in before the end of March 2020.

The Commission welcomes the progress that Highways England has made in bringing forward enhancements to the M62 between Liverpool and Manchester and between Manchester and Leeds. It will be important that planned completion dates are met so that the benefits of increased capacity and journey reliability across the Pennines can be realised as quickly as possible.

Recommendation 9

Development funding should be prioritised for a package of further enhancements to the northern road network, so that these can be completed as early as possible in the next Roads Investment Period. This package should include: upgrades to the M56 (junctions 6-8) around Manchester Airport; the redevelopment of the Lofthouse Interchange and Simister Island junctions; and capacity enhancements to the M1 (35a-39) between Sheffield and Leeds.

Government Response (April 2016)

The Government accepts that development of enhancement schemes on the northern road network should be prioritised. Development funding is already in place for these projects. Construction of the M56 Junctions 6-8, which is already committed under the current Road Investment Strategy (RIS), will begin by 2020 at the latest. The other three projects will begin detailed development work this Parliament so they can be among the first in line for new funding in the next roads investment period. For the two junction schemes, the complexity of this work means that development will need to start in 2016-17. For the M1 smart motorway scheme, a simpler planning process means this can start development later in RIS1 and still be ready for early construction in RIS2.

M56 around Manchester Airport (junctions 6-8)

Highways England has committed to upgrading the M56 to Smart Motorway between junction 6 (Manchester Airport) and junction 8 (A556). Alongside other planned improvements this will form part of a comprehensive upgrade to Manchester's southern access.

The M56 scheme is currently in the 'development' phase. However, following a recent review, it has been agreed to advance the start of construction to 2018/19 (Q4), 12 months ahead of its original delivery date.

Road Investment Strategy: 2020/21 to 2024/25

As the first step in the process for setting the second Road Investment Strategy – known as RIS2 – Highways England published its Strategic Road Network Initial Report and a range of supporting documents in December 2017. Together these documents set out Highways England's assessment of the current state of the Strategic Road Network, its potential future needs and the agency's proposed priorities for RIS2.

The Department for Transport is currently consulting on the proposals put forward by Highways England. Once all feedback has been considered, and the findings published later this year, DfT will develop the new Road Investment Strategy, due to be published in 2019. A Delivery Plan will follow from Highways England setting out the detailed programme of investment to be carried out across 2020–2025, based on the commitments in the new Road Investment Strategy.

Redevelopment of M1/M62 Lofthouse Interchange

The Commission understands that Highways England is continuing to explore a range of options to improve the junction between the M1 and M62 with the aim of reducing congestion and delays during peak times.

In line with the Government's commitment to begin detailed development work this Parliament, Highways England has carried out a range of surveys and assessments to inform its thinking on future design options. Based on this work, the Government will decide on whether to fund the project as part of RIS2.

M60 Simister Island junctions

Highways England is investigating various options to improve the Simister Island interchanges between the M62, M60 and M66 to the north east of Manchester. It will be important for Highways England to have completed its early development work by the end of 2019 so that any final scheme can be considered for construction early in the next 5-year road investment period, subject to the Government's decision on whether to fund the project as part of RIS2.

Capacity enhancements to the M1 between Sheffield and Leeds (junctions 35a-39)

The Commission understands that Highways England is continuing to explore options for upgrading the M1 between junction 35A (A616) and junction 39 (Denby Dale) near Barnsley. As with other schemes, it will be important that preliminary work is completed in time for any future scheme to be assessed by the Government for funding during the next investment period.

The Commission welcomes the decision to bring forward the upgrade of the M56 (junctions 6-8) 12 months earlier than planned. This will ensure the benefits of increased capacity and journey reliability are realised as quickly as possible.

The Commission also welcomes the progress which Highways England has made in exploring options to improve Lofthouse and Simister Island interchanges to ease congestion and improve traffic flow between key strategic corridors in the North. It will be important that preliminary work on these schemes is completed in time for future schemes to be assessed alongside other priorities as part of its plan for improving the strategic road network during the next investment period.

Recommendation 10

Highways England, the Department for Transport and TfN should continue the current programme of longer-term studies. This work should take due consideration of consistency with strategic objectives, feasibility, affordability, forecast demand and congestion levels, and environmental factors.

Government Response (April 2016)

The Government agrees with the commission's recommendation and welcome its support for the joint Government-TfN strategic studies into the future of the northern road network. The developing conclusions of all three studies show that there are good opportunities for ambitious proposals to make significant contributions to the northern economy. The Government has provided £75 million from the Transport Development Fund to fund the development of projects emerging from the A66/A69, Manchester North-West Quadrant and Trans-Pennine Tunnel strategic studies. Conclusions from all three studies will be reached later in 2016 and formal development work will proceed from there.

Since the publication of the Commission's *High Speed North* report, the Department for Transport, Highways England and Transport for the North (TfN) have been working closely together on addressing the conclusions of three Strategic Road Studies.

In its recently published Strategic Transport Plan, TfN provided the following update:³⁶

- *The **Northern Trans Pennine Routes Study** assessed the strategic and economic case for dualling the full length of the A66 between the A1 at Scotch Corner and the M6 at Penrith. This included making targeted interventions to improve safety, environmental, and connectivity issues on the A69 between Newcastle and Carlisle. This programme of work will shortly move to the option identification phase of development.*
- *The **Manchester North West Quadrant Strategic Study**, covering sections of the M60, M62, M602, M61 and M66, has demonstrated there is a strong strategic case for the substantial upgrade to improve journey times, east west connectivity, safety, and user experience. This programme of work will shortly move into the next phase of development to identify options which deliver best value for money, whilst improving and mitigating any adverse sustainability impacts.*
- *The **Trans Pennine Tunnel Strategic Study** examined options for providing significantly improved road connectivity between Greater Manchester and Sheffield City Region, and the wider southern Pennines corridor. This programme of work has shown that although a long tunnel under the Peak District National Park would be technically feasible, the cost would be prohibitive and offer poor value for money.*
- *TfN is now leading on developing alternative options, working closely with Highways England and the Department for Transport, that will provide a more cost-effective solution, while addressing sustainability requirements. This includes ensuring that the road connectivity improvements would be an exemplar scheme involving environmental enhancements to benefit the Peak District National Park.*
- *To date, this work has found that the most promising alternative option is a partially tunnelled route on the line of the existing A628, with a supporting package of wider road connectivity enhancements, including on the M60, M67 and M1, which would have road user and economic benefits for the Sheffield City Region, Greater Manchester, and the wider Northern economy. This alternative option would also have the benefit of possibly being sequenced in its delivery. This work will also build on Highways England's existing Trans Pennine Upgrade programme, including improvements to the A57 at Mottram.*

The Commission welcomes the progress that the Department for Transport, Highways England and Transport for the North have made in taking forward the conclusions and next steps identified in the relevant Strategic Road Studies. The Commission looks forward to examining further detailed proposals arising from this work in due course.

Recommendation 11

Sufficient funding should be made available by Government to support the development of an ambitious cross-modal strategy for northern transport with HS3 at its heart.

Government Response (April 2016)

The Government agrees with the commission's recommendation and at Budget 2016 committed a £300 million funding package which will take this forward. This is in addition to the £50 million the Government has already committed over the life of this Parliament to enable TfN to develop and take forward a cross-modal Northern Transport Strategy and the £150 million of funding committed at the 2015 Spending Review to support the rollout of smart and integrated ticketing across the North. The first annual update to the Northern Transport Strategy was jointly published by TfN and DfT in March 2016. By 2017, TfN will be established on a statutory basis and empowered to develop and drive forward transport plans which will support economic growth in the North.

In 2016, the Government committed £60 million for Transport for the North (TfN) to develop plans for the Northern Powerhouse Rail network (sometimes referred to as 'HS3'). This funding came in addition to £50 million the Government had already committed to enable TfN to develop a cross-modal Northern Transport Strategy and £150 million of funding committed at the 2015 Spending Review to support the rollout of smart and integrated ticketing across the North.

The Commission welcomes the initial funding package of £260 million which the Government has agreed with Transport for the North (TfN). This will provide TfN with the necessary resources to deliver its programme of work to 2020. The Commission encourages the Government to consider a similar long-term approach to funding TfN at future spending rounds.

Connected Future (December 2016)

In March 2016, the Commission was asked to advise Government on the steps the UK should take to become a world leader in the deployment of 5G mobile telecommunications networks, and ensure that the UK can take early advantage of the applications those networks may enable.

Connected Future was published in December 2016. The Commission's central finding was that mobile connectivity has become a necessity. The market and existing regulatory frameworks have driven great advances since the advent of the mobile phone but Government must now play an active role to ensure that basic services are available wherever people live, work and travel. The UK's roads, railways and city centres must be made 5G ready as quickly as possible.

An update on progress in implementing each recommendation is set out below.

Recommendation 1

Digital infrastructure lies at the heart of the UK's industrial strategy and affects every sector of the economy. To reflect its importance, ultimate Government responsibility for digital infrastructure should reside in one place under a single cabinet minister with the authority to shape policy and delivery across Government, ensuring that it delivers the Government's overarching digital strategy.

This work should report to the Economy and Industrial Strategy Cabinet Committee. It should:

- identify the public projects that contain a significant element of digital infrastructure and establish and maintain a plan which sets out how they can help deliver the Government's overarching digital strategy and maximise the benefit of better mobile telecommunications for UK citizens and businesses;
- hold the various parts of Government that are delivering digital infrastructure to account, in order to ensure adequate telecoms network provision in the delivery of its infrastructure programmes;
- ensure that when upgrading existing or delivering new infrastructure, such as that alongside our roads and railways, the long-term capacity needs of telecoms networks are considered and met. This could include installing more fibre and additional infrastructure to make sure that networks are future-proof. It will also mean ensuring that the networks are readily accessible to communications providers;
- be a centre of telecoms expertise within Government that supports departments in determining their needs and procuring telecoms infrastructure, and support departments in demonstrating and testing of new, digitally enabled ways of delivering public services such as education and healthcare; and
- support and challenge local Government in their plans to enable the delivery of digital infrastructure; both in terms of ensuring that these plans help the UK to meet its national objectives, and that local authorities develop consistent approaches to support the deployment of mobile infrastructure across the country.

Government Response (March 2017)

The Government agrees that responsibility for digital infrastructure should reside in one place under a single cabinet minister. The Secretary of State for Culture, Media and Sport is the lead Minister for digital infrastructure, and has overall responsibility for delivering the Government's commitments in this area. DCMS is in the process of strengthening its telecoms capabilities and expertise in support of this mission. As the Commission notes, the department has created a Director General (DG) with overall responsibility for the digital economy and is also creating a new dedicated Director of Telecoms post.

The Government will establish a new Digital Infrastructure Officials Group, reporting to the Secretary of State for Culture, Media and Sport, chaired by the new Telecoms Director and comprising senior officials from relevant Government departments, to:

- coordinate public projects across Government that have a significant element of digital infrastructure delivery; and
- ensure that when upgrading existing or delivering new infrastructure projects, the long-term capacity needs of telecoms networks are considered and met wherever practical, affordable and value for money.

The Government is also establishing a new centre of 5G expertise within DCMS to deliver the testbeds and trials programme. Its role will include:

- ensuring that 5G development activity across central Government and other public sector bodies is joined up in a way that meets the strategic objectives of the programme to accelerate deployment, maximise benefits and enhance opportunities for UK businesses and inward investment. This includes ensuring best practice is captured, and knowledge is disseminated;
- working with industry and public sector bodies to identify a pipeline of potential projects to be trialled on the new 5G testbed networks; and
- providing support and challenge to local Government in developing local connectivity plans, including through a new joint working group and in allocating funds through the 5G testbeds and trials programme.

The Government will work through the Digital Infrastructure and Inclusion Implementation Taskforce, chaired by the Secretary of State for Culture, Media and Sport, to deliver our response to the Commission's recommendations and the actions in this strategy. The Secretary of State will update the Economy and Industrial Strategy Cabinet Committee on progress in delivering the strategy.

Annual Monitoring Report Update (2018)

In July 2017, the Government recognised the growing importance of digital connectivity and agreed an official change of name for the Department for Culture, Media and Sport, which has now become the Department for Digital, Culture, Media and Sport (DCMS). The department estimates that roughly half of its policy and delivery work now covers the digital sectors, including telecommunications, data protection, internet safety, cyber skills and parts of media and the creative industries.

Over the course of 2017, DCMS continued to strengthen its telecoms capabilities and expertise, with the creation of a new Telecoms Directorate. As at January 2018, the Directorate was supported by around 100 officials, with a further 40 officials expected to be recruited over the coming months. The creation of a new centre of 5G expertise within DCMS to deliver the Testbeds & Trials Programme is a welcome development, as is the establishment of the UK 5G Innovation Network.

The recent creation of a new cross-Whitehall ‘barrier busting’ taskforce, led by DCMS, ensures that other departments now have ready access to advice and expertise when rolling out digital infrastructure or procuring telecoms infrastructure, and a newly formed Telecoms Strategy Board – comprising senior officials from across Whitehall and reporting directly to the Secretary of State – now meets quarterly to coordinate telecoms policy and public projects involving significant digital infrastructure.

The Secretary of State for Digital, Culture, Media and Sport is the lead Minister for digital infrastructure, with overall responsibility for delivering the Government’s commitments in this area, and provides updates to the Economy and Industrial Strategy Cabinet Committee on progress in delivering the Government’s 5G Strategy.

The Commission welcomes the strong progress DCMS has made in strengthening its telecoms capabilities and expertise over the last year, and the enhanced governance structures that have been put in place to oversee its overarching digital strategy.

Recommendation 2

Our motorways must have mobile telecommunication networks fit for the future. It is vital that our motorways can meet both the long term operational needs of connected vehicles and the connectivity needs of the passengers. This will necessitate the timely installation of an open and accessible mobile telecommunication and backhaul network that is fit for the future.

The Government should set out its plans for how to deliver this by the end of 2017. As part of this work consideration should be given to who is best placed to install, manage, fund and own the network, noting the potential for private sector funding.

Ensuring that best use is made of the existing infrastructure, such as masts, poles, ducts power supplies and the fibre network alongside our motorways, so that it can be used to support the backhaul of mobile data will be essential.

Ultimately, the Government should ensure that the necessary infrastructure is in place on motorways by 2025 at the latest if it wants to offer a reasonable level of connectivity on a timescale consistent with the deployment of 5G networks.

Ofcom should set out how a regulatory regime would support these different operating models.

The provision of a robust and forward looking communications network infrastructure on our motorways should inform the process for ensuring that there is adequate coverage and capacity on the rest of the road network to meet future needs, including the partnerships needed between road stakeholders and mobile communications providers.

Government Response (March 2017)

The Government agrees that in the future it will be important to have greater connectivity on the UK's transport networks to support new ways of travelling and working. The Commission's report highlights the potential for commercial provision of telecommunications services on our transport networks. The Department for Transport (DfT) and DCMS will work with industry to assess the potential for commercial delivery models and how new and existing infrastructure can be used to support them and will report back by the end of 2017.

The Government will consider the range of issues concerning road and rail coverage in its report on delivery model options. Where telecoms regulation is identified as a potential barrier, it will involve Ofcom in discussions as appropriate to determine how best to deliver the Government's coverage objectives.

The Government will also consider funding live trials where there is potential for wider UK benefit as part of the coordinated 5G testbeds and trials programme, particularly where this could build on other work such as the planned A2/M2 connected corridor or the connected and autonomous vehicles testbeds programme announced at Autumn Statement 2016. In this way we will look to gain further insights into the challenges and benefits of the deployment of 5G and related technologies on the motorway network.

Annual Monitoring Report Update (2018)

Following the publication of the Commission's *Connected Future* report, the Government has continued to engage with the automotive market and telecommunications industry to examine the viability of delivering a 5G-ready roadside network. This engagement has confirmed that early connected and automated vehicles (CAVs) are likely to remain operationally self-sufficient (for example, using their own systems to interact with other vehicles and assess the surrounding environment) for essential safety features. However, other applications, including some which may enhance road safety, are likely to require better and more consistent connectivity than is currently available on many roads.

At Autumn Budget 2017, the Government announced, as part of its 5G testbeds and trial programme, that it would provide funding of £5 million for an initial trial, starting in 2018. This will be used to test the deployment and commercial aspects of providing roadside 5G infrastructure, and to understand whether there is a business case for investment in the deployment of 5G-ready roadside infrastructure across the UK's motorways. This activity will further develop the work already progressing on connected and autonomous vehicle trials in the West Midlands.

In December 2017, Highways England let its second National Roads Telecommunications Service contract. This will see a range of equipment on the digital network running adjacent to the majority of motorways in England renewed.³⁷ As part of this process, Highways England is seeking to ensure that its network is ‘future proofed’ and scalable to meet future requirements as and when they occur.

However, the Government is yet to express a firm view on how any future roadside network should be installed, managed, owned or funded, despite the commitment in its response to this recommendation to carry out work on commercial delivery models and report back by the end of 2017.

The Commission welcomes the progress on operational trials and further research and development. It calls on Government, however, to accelerate its work on assessing commercial models for the deployment of 5G-ready roadside infrastructure across the UK’s motorways, in order to enable delivery by 2025 at the latest and meet the long term connectivity needs of both connected and autonomous vehicles and passengers.

Recommendation 3

Rail passengers should have high capacity wireless connectivity. This should be achieved through a delivery model that utilises trackside infrastructure to provide an open and accessible mobile telecommunication and backhaul network that is fit for the future.

The Government should set out its plans for how to deliver this by the end of 2017. As part of this work consideration should be given to who is best placed to install, manage, fund and own the network, noting the potential for private sector funding.

Ensuring that best use is made of the existing infrastructure, such as masts, poles, ducts power supplies and the fibre network alongside our railways so that it can be used to support the backhaul of mobile data will be essential.

Ultimately, the Government should ensure that the necessary infrastructure is in place on the main rail and key commuter routes by 2025 at the latest if it wants to offer a reasonable level of connectivity on a timescale consistent with the deployment of 5G networks.

Ofcom should set out how a regulatory regime would support these different operating models.

Government Response (March 2017)

The Government agrees that in the future it will be important to have greater connectivity on the UK’s transport networks to support new ways of travelling and working. The Commission’s report highlights the potential for commercial provision of telecommunications services on our transport networks. DfT and DCMS will work with industry to assess the potential for commercial delivery models and how new and existing infrastructure can be used to support them and will report back by the end of 2017. This will include consideration of models for delivering better 4G connectivity on the rail network to help to pave the way for excellent 5G connectivity.

The Government will consider the range of issues concerning road and rail coverage in its report on delivery model options. Where telecoms regulation is identified as a potential barrier, it will involve Ofcom in discussions as appropriate to determine how best to deliver the Government’s coverage objectives.

The Government will also consider funding live trials where there is potential for wider UK benefit as part of the 5G testbeds and trials programme, particularly where this could build on existing or planned projects around railway connectivity. Any trials will also help to deliver benefits to passengers from improved connectivity.

Annual Monitoring Report Update (2018)

In its *Connected Future* report, the Commission found that existing mobile operator coverage on the UK's rail network was failing to provide sufficient coverage or capacity to deliver a quality service to all passengers. The most recent National Rail Passenger Survey has reaffirmed this finding, with just 30% of passengers reporting that they were satisfied with the reliability of the internet connection on their journey.³⁸

Government action to date has focused on using the rail franchising system to make Train Operating Companies (TOCs) responsible for delivering in-train Wi-Fi, introducing a requirement in 2015 for all new franchises to provide an average data speed of 100 megabits per second (Mbps) per train, increasing by 25% in each year after 3 years.

Although nearly all trains will have Wi-Fi equipment fitted by 2020, in practice many of the technologies currently being used by TOCs to boost in-train signal levels will still rely on having a good outdoor mobile signal connection to the train, which is often unavailable. In addition, delivery of 100 Mbps to each train is unlikely to meet growing passenger demand for data. Even if all TOCs were to meet the requirement to accommodate growth of 25% per annum, this is less than half of the currently observed rate of mobile data growth.³⁹ In addition, the Government now estimates that a heavily loaded, high capacity train would require at least 1 gigabit per second to support video-streaming to hundreds of passengers.⁴⁰

The Government has acknowledged that more radical action is needed to keep pace with the forecast growth in mobile data traffic and has asked Ofcom to identify the bandwidth needed per passenger and per train that passengers ought to expect as a minimum. It is envisaged that this will be revised upward as consumer expectations and passenger usage grows. Following discussion with industry, the Government has also stated that the best way to improve connectivity on the rail network in areas of high passenger demand is likely to be through using trackside infrastructure.

Despite the commitment to report back by on commercial models by the end of 2017, the approach to delivering improved passenger connectivity on major rail routes is still under consideration. In December 2017, DCMS launched a call for evidence on commercial options to improve connectivity for rail passengers, exploring potential revenue streams and commercial funding models.⁴¹ This closed on 7 February 2018 and the responses will inform the Government's future decision on its preferred delivery model.

The Government has also confirmed that any rollout is likely to include laying fibre along the rail corridor to provide high speed backhaul for mobile data; mounting wireless devices on masts (and other trackside infrastructure) to transmit the signal to the train; and providing power supplies to these masts.⁴² At Autumn Budget 2017, the Government committed to invest up to £35 million to enable a series of trackside trials to take place. These include upgrading Network Rail's test track in Melton Mowbray and installing trackside infrastructure along the Trans Pennine route between Manchester, Leeds and York.

Making the most of existing trackside infrastructure – such as masts, poles, ducts, power supplies and the existing fibre network running alongside our railways – will be critical to improving connectivity in the shortest time and at the lowest cost, and the Government has therefore committed to make Network Rail’s trackside assets available to support any future commercial delivery model. The Commission intends to follow up on this commitment in future monitoring reports, to ensure that any relevant industry players are being given the necessary access to public assets.

The Commission recognises the steps being taken by Government to improve digital connectivity for rail passengers, including the funding for trackside trials, but it calls on the Government to accelerate its work on commercial delivery models to establish a preferred model for the deployment of trackside infrastructure as soon as possible. This infrastructure should be in place on main rail routes by 2025 at the latest if delivery is to take place on a timescale consistent with the wider deployment of 5G networks.

Recommendation 4

Local Government should actively facilitate the deployment of mobile telecoms infrastructure.

Local authorities should work together and with Local Enterprise Partnerships (LEPs) to develop coordinated local mobile connectivity delivery plans. These plans should:

- set out how local authorities and LEPs will enable the deployment of mobile networks and maximise the opportunities and benefits to residents and businesses;
- be developed in discussion with mobile network operators and infrastructure owners;
- identify a designated individual with lead responsibility for engaging with mobile telecoms infrastructure providers;
- consider the role of local Government assets and infrastructure, (e.g. land, buildings, roads, street furniture) and help coordinate the role that other public buildings in an area (e.g. hospitals and universities) can play to facilitate the deployment of mobile telecoms infrastructure; and
- consider how the deployment of digital infrastructure can be established as a priority in local planning policy.

Local authorities and LEPs should report annually to the Government department with responsibility for digital infrastructure on their progress delivering against these plans.

Local models for facilitating the deployment of these networks should be piloted and evaluated to inform national roll-out. Any pilot programme should allow for the evaluation of deployment models in different types of area (e.g. urban, rural, coastal) and in both single-tier and two-tier local Government areas. It should also seek to establish how high quality design can minimise the impact of hosted infrastructure on the built environment. Such pilots would be a good use of a proportion of the funding recently announced in the Autumn Statement to support mobile telecoms infrastructure.

Government Response (March 2017)

The Government agrees with the NIC that local areas have a critical role to play in facilitating the deployment of mobile telecommunications infrastructure and are already doing so in many areas. Through its Housing White Paper, 'Fixing our broken housing market', the Government is currently consulting on requiring local authorities in England to have planning policies setting out how high quality digital infrastructure will be delivered in their area.

Outside of the planning policy framework, the Government believes that there may also be a case for encouraging and supporting local areas to develop broader plans to deliver local mobile connectivity. These local connectivity plans would articulate how an area will meet its connectivity needs and ideally should be developed through engagement with key interested bodies including Local Enterprise Partnerships and the telecommunications industry.

The Government will consider further what these plans might look like with the intention of producing some guidance on best practice in 2018. The Government will take account of the presence of local connectivity plans and evidence of taking a proactive approach when allocating funds to local projects through the selection process for both local fibre and 5G trials programme funding. Government would expect to see, for example, engagement with relevant Local Enterprise Partnerships, supportive planning policies, Chief Technology Officers and asset registers.

The 5G testbeds and trials programme will seek to evaluate different local models for facilitating the deployment of 5G infrastructure in different types of area such as urban or rural, and both single and two-tier Local Authorities and will consider this as part of any selection process to award funding. Trials will consider how high-quality design can minimise the impact of digital infrastructure on the built environment in order to make deployment more effective.

The contribution of industry is vital to helping local authorities and other local groups to understand potential costs and benefits of infrastructure roll-out. The Government will bring together a working group of local areas and industry with the aim of providing an accurate picture of local area requirements for the deployment of 5G networks. This group will also allow Government and industry to share knowledge of 5G network planning and will feed into the new centre of 5G expertise in DCMS.

Annual Monitoring Report Update (2018)

In line with the Commission's findings, the Government has recognised that Local Authorities and Local Enterprise Partnerships (LEPs) will have a critical role to play in facilitating the deployment of thousands of small wireless cells expected to be necessary to deliver high frequency 5G technologies. Mobile Network Operators (MNOs) will need to bring together their network expertise with that of local authorities, who are best placed to understand the needs of their area.

To address this need, the Government has established a new Local Connectivity Group, managed by techUK, bringing together local areas, Government departments, Ofcom, landowners and industry. The Government expects that this group will help to assess local area requirements for the deployment

of digital infrastructure and encourage local areas to develop plans for digital connectivity through local area partnerships. It is also hoped that it will help limit inconsistencies in interpreting regulations affecting infrastructure deployment across the country.

The action that Aberdeen City Council has already taken to launch a 5G-ready small cell network connected by fibre provides a ready example of what can be achieved through proactive local authority involvement.⁴³ The challenge for Government is now to replicate this approach across the country.

In addition to the Local Connectivity Group, the Government also intends to use the Local Full Fibre Network (LFFN) and other 5G programmes to drive change in local areas by encouraging them to have policies in place that are supportive of digital infrastructure. And the government has been working with local areas and industry to streamline the process by which public sector assets are made available for mobile infrastructure, using a small selection of councils as pilots.

Evidence of direct engagement with LEPs has been limited to date. The wider programme of local engagement planned by DCMS for 2018, however, could present an opportunity to involve LEPs more directly in the process.

In the longer term, planning policy may represent the most appropriate tool for ensuring local plans are in place to support the deployment of digital infrastructure. The Government's housing White Paper, *Fixing our Broken Housing Market*, published in February 2017, put forward proposals that would require local planning authorities to have policies in place setting out how high quality digital infrastructure will be delivered in their area.⁴⁴ Information on the next steps for this proposal, taking account of the subsequent consultation on housing need, is expected shortly.

The Commission believes it will be important for Government to lead by example. The forthcoming publication of a cross-Departmental Digital Infrastructure Toolkit produced by the Government Property Unit (GPU) – providing market competitive rates, lease guidance and a standard lease – offers an important opportunity to open up the Government estate to incorporate digital infrastructure.

The Commission welcomes the Government's engagement with local authorities to date and the establishment of a new Local Connectivity Group to share best practice. The Commission recommends that LEPs are engaged more directly in the process of assessing local area requirements over the coming year, with a view to reviewing the most effective channel(s) for local engagement at the end of the year. A wider plan for delivering the proposals relating to digital infrastructure put forward in the Government's recent housing White Paper should follow as a priority.

Recommendation 5

Government and Ofcom should develop a meaningful set of metrics that represent the coverage people actually receive and use these to determine a mobile universal service obligation setting out the minimum service level people should expect to receive:

- Ofcom, Government and mobile operators should report their coverage so that they are genuine and meaningful reflections of the services enjoyed by customers. Metrics should be measurable and based on the reality of service and coverage provided to customers, not based on simulated or predicted performance.

Ofcom should set out how this is best achieved by the end of 2017. Ofcom and Government should use these metrics as the basis of future interventions such as spectrum licence obligations or voluntary agreements with operators.

Government, Ofcom or the Advertising Standards Authority should take action if operators advertise or report coverage in a way that does not reflect services being delivered to consumers on an everyday basis.

- Mobile services are increasingly viewed as essential, underpinning our daily lives and the digital economy. Government must deliver a view by the end of 2017 on what aspects of mobile services are considered “essential”. It should then establish how this “essential” level of service provision can be made available through a mobile universal service obligation regardless of the network to which a customer is subscribed. Government should engage with Ofcom and industry to establish the best delivery mechanism, whether through spectrum licence obligations, enabling roaming, enabling cross operator Mobile Virtual Network Operators (MVNOs), through Government procurement or a mix thereof.

Government, with the assistance of Ofcom, should deliver this as soon as is practical but no later than 2025.

Government Response (March 2017)

The Government agrees with the NIC that the reporting of coverage should provide a genuine and meaningful reflection of the services experienced by customers and the Government will ask Ofcom by the end of 2017 to set out how this will be achieved for existing services.

Subject to the development of suitable metrics for mobile coverage, the Government will consider how it might best use these metrics to inform future policy.

The Advertising Standards Authority (ASA) is the UK’s independent regulator of advertising across all media and is responsible for taking action against advertisements which are misleading in contravention of the UK Advertising Codes. The ASA already has rules that can be used to address any misleading representations of mobile coverage in UK advertising and, as with all of its rules, keeps these under continual review. If the ASA sees a pattern emerging that coverage is being advertised in a misleading way, it may consider sector compliance activity or provide guidance to industry and in this instance the Government would encourage the ASA to take whatever action it considers appropriate.

The Government also agrees with the Commission that there should be high quality coverage where people live, work, and travel. We are looking at how we can make sure that 4G networks are deployed to a scale and quality that will meet this ambition, while also supporting investments that will enable future 5G networks. We will set out by the end of 2017 what the essential elements of high-quality coverage where people live, work and travel are, and how we will achieve this as soon as is practical, but by no later than 2025.

Annual Monitoring Report Update (2018)

In March 2017, the Government accepted that reporting of mobile coverage should provide a genuine and meaningful reflection of the services experienced by customers and undertook to “set out by the end of 2017 what the essential elements of high quality coverage where people live, work and travel are, and how we will achieve this as soon as is practical, and no later than 2025”.⁴⁵

Ofcom’s latest assessment of mobile coverage across the UK has confirmed that levels of coverage are around 10 percentage points lower for modern smartphone users than when measured under historic coverage obligations. This is because newer smartphones and tablets typically require stronger signals than older, simpler phones. In practice, this means that mobile network operators (MNOs) are currently providing outdoor coverage to only 80% of the UK landmass rather than 90%.

These better measures of mobile coverage have highlighted the seriousness and scale of gaps in the UK’s mobile coverage. The Commission has written to Ofcom, challenging it to come up with an action plan for Government to radically improve mobile coverage in the short to medium term.

The Commission welcomes Ofcom’s new approach for defining mobile coverage in a way that reflects the coverage needed to provide a decent experience to smartphone users. This is an important step forward in providing consumers with information about the true picture of mobile coverage and network quality in their area, which in turn enables them to make more informed choices.

Ofcom has also carried out a programme of testing to identify the minimum coverage level required to deliver a good quality of experience to consumers on the 4G network, supplementing its previous testing of the 2G and 3G networks. In December 2017, Ofcom set out its definition of mobile coverage to deliver a decent experience for smartphone users.⁴⁶ This equates to:

- **Telephone calls:** Nearly all 90-second telephone calls being completed without interruption.
- **Data services:** Nearly all connections delivering a speed of at least 2Mbit/s. (This is fast enough to allow smartphone users to browse the internet and watch glitch-free mobile video).

Alongside this definition, the Government has stated that it considers “essential elements” of high quality coverage to include a high call success rate and the ability to deliver a range of services that are most commonly used, including text, email, e-Gov services, banking and payment apps, health apps, online shopping, audio streaming, reading online news, mapping services and other basic apps.⁴⁷

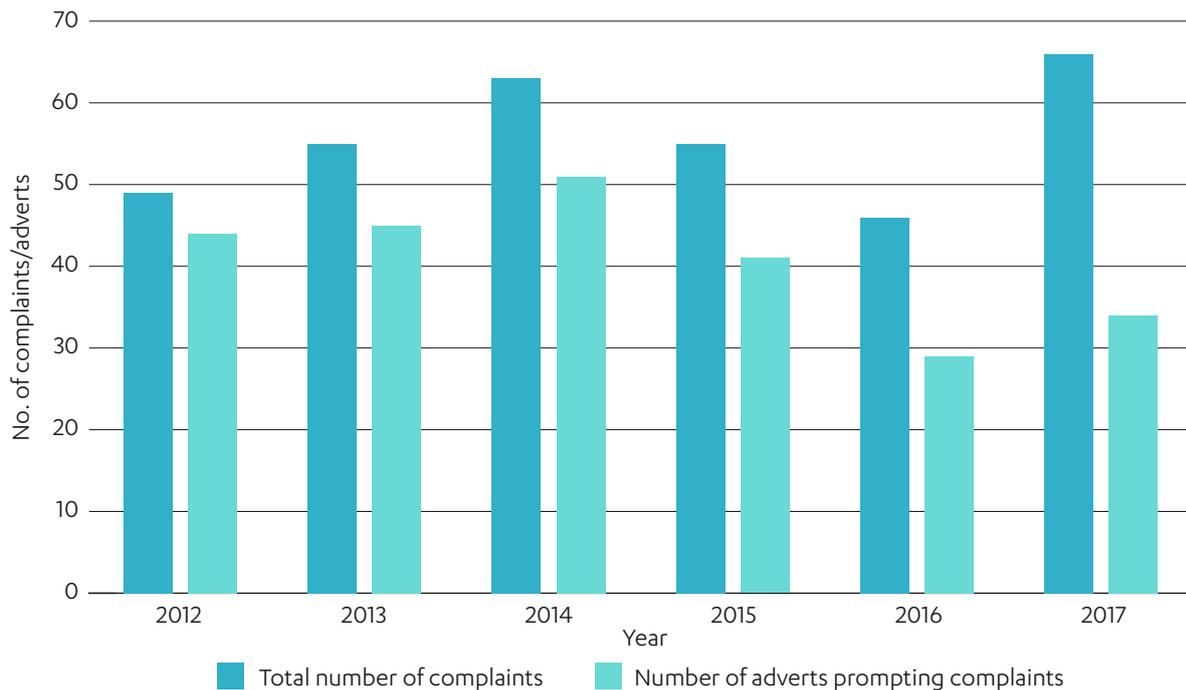
While this is a welcome first step, and despite the end of 2017 deadline set out in the Government’s response, further work is needed to translate this definition into precise coverage expectations and to identify how these will be achieved.

The Commission reiterates its call on Government to consider how an “essential” level of service provision could be made available to all consumers and to set more precise definition for delivering the necessary levels of coverage “where people live, work and travel”. In addition, the Commission recommends that Ofcom’s new definition of ‘decent’ mobile coverage is kept under regular review to reflect changing consumer expectation of mobile services and to ensure it continues to reflect the quality of service experienced by consumers on a day-to-day basis.

The table below shows the numbers of complaints the Advertising Standards Authority (ASA) has received from consumers about misleading representations of mobile coverage in UK advertising in each of the last six years.

The Commission is satisfied that the ASA has the necessary processes in place to spot any pattern emerging of misleading representations of mobile coverage in UK advertising. The ASA has also demonstrated that it will act against advertisements found to be in contravention of the UK Advertising Codes.

Figure 1: Numbers of complaints made to the Advertising Standards Authority (ASA) about misleading representations of mobile coverage in UK advertising



[Source: Advertising Standards Authority]

Recommendation 6

By the end of 2017 Ofcom and Government must review the existing regulatory regime to ensure that it supports the sharing of telecoms infrastructure. This will be particularly important for areas of the country where competition driven markets have struggled to provide the necessary mobile infrastructure.

Government Response (March 2017)

The Government agrees with the NIC that infrastructure sharing, in compliance with competition rules, can be an effective and economically efficient way of delivering telecommunications infrastructure, especially in areas where it is uneconomic to deploy competing infrastructure networks. However, we are also mindful of the need to protect investment incentives.

Mobile networks have already seen consolidation through joint ventures between Vodafone and Telefonica (CTIL) and between EE and Three (MBNL). Independent infrastructure providers that lease capacity on masts to several network operators provide a similar benefit. The Government is also looking to ensure that infrastructure delivered as part of the new Emergency Services Network can be made available for shared use, where possible.

We recognise that regulatory and legal frameworks can impact the extent of infrastructure sharing. The Government will work with Ofcom to identify and tackle unnecessary barriers to infrastructure sharing and will explore the potential for a clearer and more robust framework for sharing, while preserving investment incentives. We will report on progress by the end of 2017.

Annual Monitoring Report Update (2018)

The Government has accepted that greater infrastructure sharing can help the economic case for investment in 5G-ready networks, although it does not believe that the current regulatory system is acting as a barrier to this.⁴⁸

The Government has also acknowledged Ofcom's concern that it will be important in any sharing model to preserve investment incentives and to reduce the potential for collusion between operators.⁴⁹ Nevertheless, the sharing of infrastructure is likely to be a more effective and economically efficient way of delivering 5G technologies in areas where it is uneconomic to deploy competing infrastructure networks.

In addition to considering how infrastructure sharing can be used to support the roll out of 5G networks, however, it will be important to consider how network sharing arrangements could be used to improve existing mobile coverage where the market is not delivering an adequate solution. The Commission believes this is one of the potential measures that could be considered to meet coverage expectations where people live, work and travel once these have been established in detail.

With regards to other actions to improve coverage in poorly served areas, the Digital Economy Bill received Royal Assent in April 2017 and introduced a range of measures to make it easier for network operators to roll out infrastructure on public and private land. The Commission intends to monitor this situation over the coming months to ensure that the intended improvements are being delivered.

In the meantime, Government has continued to promote a more competitive market in full fibre, which is a crucial component in expanding mobile networks and has launched a Future Telecoms Infrastructure Review to explore the barriers to investment in next generation digital connectivity, and to examine what, if any, policy changes Government should consider.

Recommendation 7

Ofcom and Government must ensure they keep pace with the rapid evolution of the mobile communications market, and that the regulatory regime is fit for purpose. By the end of 2017 Ofcom and Government must review the regulatory regime to ensure that spectrum allocation and regulatory decisions support a growth model in a world where technology developments enable greater shared access and interoperability. Government and Ofcom should review how unlicensed, lightly licensed spectrum, spectrum sharing and similar approaches can be utilised for higher frequencies to maximise access to the radio spectrum. Spectrum decisions should where possible enable:

- Community or small provider solutions to meet the needs of local areas if they remain unserved or poorly served.
- Niche entrants or sub-national players to access the higher frequency spectrum anticipated for 5G. Allocation of nationwide spectrum licenses to a small number of operators could leave large areas of the UK fallow.
- Businesses, universities and others to access spectrum where they need to within their factories or buildings, including already licensed spectrum if there are no interference risks. This will unlock multiple wireless service provider options, including self-provision, spurring the innovation in industrial internet of things, wireless automation and robotics.

Government Response (March 2017)

The Government agrees with the NIC that regulation should be fit for purpose and keeps the regulatory regime for spectrum under regular review. It is sympathetic to the wishes of subnational or regional and local service providers to obtain access to spectrum to enable them to meet the needs of unserved or poorly served areas, where this would lead to a more efficient use of spectrum.

The Government will ask Ofcom to review and report back to DCMS by the end 2017, the scope for the spectrum licensing regime to facilitate better 4G and 5G deployment at national, regional and local scales, including in-building usage. This would also include issues of promoting growth of 5G coverage for a range of possible use cases. The Government will define coverage objectives and will work with Ofcom to determine how best to deliver these.

Annual Monitoring Report Update (2018)

Following the publication of the Commission's *Connected Future* report, the Government asked Ofcom to review and report back by the end of 2017 on "the scope for the spectrum licensing regime to facilitate better 4G and 5G deployment at national, regional and local scales, including in-building usage."⁵⁰ In response, Ofcom published a review of the authorisation regime for spectrum access, in December 2017, setting out its intended approach to the future authorisation of spectrum for 5G.

The document made clear that Ofcom has considerable flexibility under the Wireless Telegraphy Act (2006) to meet stakeholder demand and set out a several different authorisation approaches used in the past to meet its policy objectives in relation to national and local networks. In particular, Ofcom confirmed that it will consider further sharing in already assigned bands alongside the potential for an innovative licensing regime for millimetre wave spectrum that takes into account the particular challenges and opportunities offered by such high-capacity, short-range connectivity.

The Commission understands that the Government's emerging view is that a few large contiguous blocks of spectrum in the 3.4-3.8 GHz band are more likely to meet Ofcom's objectives to ensure optimal use of spectrum rather than many smaller ones.⁵¹ Crucially, this would still allow access to the radio spectrum for smaller subnational, local and other niche entrants, since all the existing licences issued by Ofcom have been awarded on a non-exclusive basis, with Ofcom reserving the right to grant additional licences for the use of some or all of these frequencies, with appropriate safeguards to appropriately manage the risk of interference.

The Commission notes that a further consultation on plans to enable further sharing in the 3.8-4.2 GHz band will take place in 2018, with a view to enabling innovative uses.

The Commission welcomes the work that Government and Ofcom have undertaken to review the regulatory regime to ensure that spectrum allocation keeps pace with the rapid evolution of the mobile communications market.

It will be important that further progress is made on plans for licensing the 24.25-27.5 GHz band before the ITU World Radio Conference in 2019, when international rules governing the use of radio-frequency spectrum are expected to be agreed.

The Commission welcomes the forthcoming consultation on plans to enable further sharing in the 3.8-4.2 GHz band and continues to encourage the Government and Ofcom to consider how spectrum access can be expanded for community or small providers where there is no interference risk.

Partnering for Prosperity (November 2017)

The National Infrastructure Commission was asked to provide Government with proposals and options to maximise the potential of the Cambridge-Milton Keynes-Oxford arc as a connected, knowledge-intensive cluster that competes on a global stage, protecting the area's high quality environment, and securing the homes and jobs that the area needs.

Following the project's inception in March 2016, the Commission engaged with a range of stakeholders from across the arc including local authorities, Local Enterprise Partnerships (LEPs), universities, and Government departments. This included evaluating more than 120 responses submitted by more than 145 organisations across two separate calls for evidence.

Interim Report

The Commission published its interim report into the Cambridge – Milton Keynes – Oxford arc in November 2016. This interim report presented the Commission's assessment of the key challenges facing the corridor. It also set out how the Commission would work over the next year to help tackle these challenges. The report set out seven shorter term recommendations which it believed Government should implement whilst the Commission's second phase of work was underway.

The Commission's central finding was that a lack of sufficient and suitable housing presented a fundamental risk to the success of the area. It noted that, without a joined-up plan for housing, jobs and infrastructure across the corridor, it risked being left behind by its international competitors. By providing the foundations for such a strategy, new east-west transport links present a once-in-a-generation opportunity to secure the area's future success.

At Autumn Statement 2016, Government responded to the Commission's interim report on the Cambridge-Milton Keynes-Oxford arc:

"The Government welcomes the NIC's interim report into the Cambridge-Milton Keynes-Oxford growth corridor, accepts the recommendation for an Oxford-Cambridge expressway, and will provide £27 million in development funding. The Government will also bring forward £100 million to accelerate construction of the East-West Rail line western section and allocate £10 million in development funding for the central rail section. The Government welcomes the NIC's work looking at a range of delivery models for housing and transport in the corridor, including development corporations, and will carefully consider its final recommendations."

Alongside the announcements made in the Autumn Statement, central Government departments worked collectively to establish cross-Whitehall arrangements to consider the arc in preparation for and responding to the Commission's final recommendations.

Final Report

The Commission published its final report in November 2017. The report set out nine recommendations to help achieve transformational growth across the arc. The Commission's central finding was that rates of house building will need to double if the area is to achieve its economic potential. This requires a new deal between central and local Government – one which aligns public and private interests behind the delivery of significant east-west infrastructure and major new settlements, and which seeks commitment to faster growth through a joined-up plan for jobs, homes and infrastructure. Any deal must give local areas the certainty, freedoms and resources they need to create well-designed, well-connected new communities.

Alongside Autumn Budget 2017, the Government published an overarching vision for the Cambridge – Milton Keynes – Oxford arc setting out an initial package of measures to address the Commission’s recommendations. These included:

- welcoming the Commission’s ambition for up to 1 million new homes in the arc by 2050, including the intention to consider the development of major new settlements;
- committing to funding the western section of East-West Rail, from Oxford to Bedford and Aylesbury to Milton Keynes by 2024;
- accelerating development of the central section of East-West Rail, between Bedford and Cambridge for completion by the mid-2020s;
- commitment to the Oxford-Cambridge Expressway ‘missing link’ between the M1 and Oxford, to be open by 2030;
- agreeing a housing deal with Oxfordshire, committing to a target of 100,000 homes by 2031, and developing joint statutory plans for the central and eastern parts of the arc;
- encouraging authorities to explore the introduction of a Strategic Infrastructure Tariff, in addition to CIL, to provide funding towards future development and ensure local communities benefit from investments; and
- announcing Iain Stewart MP as the Champion for the corridor.

The Government will respond in full to the Commission’s report, including any formal endorsement of its recommendations within 6-12 months. The Commission will in turn report on progress in implementing any endorsed recommendations in future Annual Monitoring Reports.

A full list of recommendations made in the Commission’s final report, *Partnering for Prosperity: a new deal for the Cambridge–Milton Keynes–Oxford Arc*, is included below.

Final Recommendations

Recommendation 1a

Government should progress work on East West Rail, the Expressway and new settlements through a single co-ordinated delivery programme, with cross-Government ministerial commitment and oversight. The aim of this programme should be to unlock opportunities for transformational housing growth through the creation of well-connected new communities. As part of this programme Government should commit to:

- £1bn to deliver the infrastructure necessary for a high quality and resilient rail commuter service between Bicester and Bedford, accelerating delivery of this section of East West Rail to a target date of 2023;
- accelerate work on the development of the new East West Rail line between Bedford and Cambridge, and commit to open the line by 2030; and

- deliver the ‘missing link’ of the Oxford-Cambridge Expressway, accelerating development work to deliver a clearly-defined and agreed route by 2025, enabling construction to begin as part of the next Road Investment Strategy (RIS 2) and be complete by 2030.

Key milestones and decision points in the development of East West Rail and the Expressway should be subject to “in principle” agreement to the development of significantly more ambitious proposals for housing growth in the arc, including major new settlements and urban extensions, and subsequently, progress in identifying, evaluating and designating sites. “In principle” agreement should be provided within 12 months. The schemes should be futureproofed to ensure the potential for expansion and improvement is not permanently and prematurely closed.

Recommendation 1b

Government should seek to introduce fast, direct services to London to enable growth in the arc between Bicester and Bletchley and improve connectivity between London and Aylesbury. Any such improvements should be contingent on local authorities’ commitment to major development between Bicester and Bletchley and around existing settlements.

Recommendation 1c

Government should work with the private sector and the relevant local authorities to agree funding packages and progress schemes to support housing and employment growth now. These should include:

- essential works required to enable passenger services between Oxford and Cowley no later than 2019; and
- the acceleration of East West Rail phase 3 works around south Cambridge to enable the delivery of a Cambridge South station in 2022 as part of Control Period 6.

Substantial private sector and local contributions, reflecting the benefits that these parties gain, will be required to enable the delivery of these schemes.

Recommendation 2a

Government and local authorities should work together, through a robust and transparent process, to designate locations for new and expanded settlements by 2020. This should involve:

- commissioning formal studies to identify and assess options for new settlements required, and potential locations for these settlements;
- consultation with communities, statutory agencies, infrastructure providers, wider stakeholders and public examination of proposed sites; and
- formal designation of sites and the publication of such assessments as legally required.

The Commission is optimistic that Government and local authorities will reach agreement on the scale and location of new settlements in the national interest. However, if agreement cannot ultimately be reached, the Secretary of State should designate these new settlements.

Recommendation 2b

Government should:

- work with local authorities to establish appropriate delivery vehicles for new and expanded settlements across the arc, considering the role that can be played by locally accountable Development Corporations, Mayoral Development Corporations, the Homes and Communities Agency and Urban Development Corporations; and
- establish New Town Development Corporations to deliver larger new and expanded settlements. In so doing, it should:
 - work with local authorities to define and agree the objectives, membership and reporting arrangements for new development corporations; and
 - provide a clear remit to support the economic success of large new settlements as centres of employment, and assist the development corporation by using wider policy levers to support local economic growth; and explore the full range of options for funding development corporations' programme of land acquisition, including providing public funding with a view to unlocking substantial private investment, and balancing considerations of short-term affordability and long-term value for money.

Recommendation 3

Government should work with local authorities to:

- put in place an independent design panel for East West Rail, the Expressway and new and expanded settlements across the arc by April 2018. This panel should work in concert with existing infrastructure design panels and new development corporations to specify, scrutinise and challenge settlement designs, plans and delivery, with a view to:
 - making most efficient use of new and existing infrastructure (including transport and utilities); – supporting positive social outcomes (including better mental and physical health);
 - achieving net gains in biodiversity and natural capital across the arc; and
 - improving quality of life for existing and future residents.

- establish arrangements for the long-term stewardship of valued community assets in each new or expanded settlement, placing responsibility and resources in the hands of the community – learning from both the Parks Trust in Milton Keynes and the Letchworth Garden City Heritage Foundation; and
- ensure that strategic infrastructure, including new elements of East West Rail and the Oxford-Cambridge Expressway, are planned and developed to achieve net gains in biodiversity and natural capital across the arc

Recommendation 4

Government and local authorities should implement measures to increase certainty on the delivery of growth enabling infrastructure.

- Government should work with local authorities to establish an indicative, long-term pipeline of strategic national and local infrastructure investments, conditional upon specific housing delivery milestones, and with firm financial commitments made at the beginning of the relevant spending review, road investment or rail industry control period. This pipeline should be established and agreed by 2020.
- Local authorities should work with LEPs, local business groups, educational institutions and other key partners to formally agree robust and credible transport plans to enable the development of the arc's key towns and cities. These should be agreed locally by April 2019. These plans should provide a firm basis for long-term growth and investment, and include plans for significantly upgrading public transport, integrating transport hubs and providing safe cycling infrastructure.

Following agreement of these long-term transport plans, Government should develop deals, bespoke to this region, with local authorities in Oxfordshire and the central section of the arc. These deals should extend powers over bus franchising, the introduction of smart ticketing, and give greater long-term certainty over future funding which authorities can use to fund, and unlock finance for, city-regional infrastructure improvements. Powers and resources should be devolved no later than April 2020.

Recommendation 5

Government should, through bespoke deals with local areas, make changes to the operation and application of CIL and s106 agreements across the arc that will:

- give groups of local authorities, working together through appropriate governance structures, the power to levy a city-regional CIL; and
- remove restrictions on the pooling of section 106 revenues and on the forward funding of infrastructure against future receipts. These changes should be agreed by 2020.

Recommendation 6

Government should consider the need for agreements extending flexibilities in the application of five-year land supply requirements. These agreements should only be considered in cases where local authorities agree deals to accommodate significantly higher levels of housing growth. Flexibilities should:

- help ensure that local areas are not exposed to increased risk of speculative development as a result of their commitment to additional growth; and
- be kept under review and made subject to local areas demonstrating progress in the delivery of major housing growth.

In all cases, agreement must preserve the requirement for local authorities to maintain a supply of land sufficient to enable house building at the rate that would have been required in the absence of any deal to support additional housing growth.

Recommendation 7

Government should work with local authorities across the arc to secure agreement that:

- representatives of each of the arc's defined sub-regions will work together at the arc-wide level, and with Government, to develop an ambitious spatial vision covering the whole arc area up to 2050, identifying locations for growth and investment and enabling infrastructure requirements. This work should be completed no later than summer 2019. This vision should be supported by a set of arc-wide economic plans and an arc-wide plan for strategic infrastructure; and
- local planning and transport authorities will work together, in defined sub-regions, to prepare statutory strategic spatial plans and submit these for inspection by April 2020. These should be underpinned by a clear investment strategy and a phased delivery plan, and shaped by the requirements of a robust integrated appraisal framework. Local Enterprise Partnerships and utilities providers should be included in the development of these strategic spatial plans.

Local authorities and LEPs should work collectively and seek to agree a definition for sub-regional planning areas by April 2018. If agreement cannot be reached by this date, the Secretary of State for Communities and Local Government should define the sub-regions based on consideration of the best areas for joined-up economic, transport and land-use planning.

Recommendation 8

Government should work with local authorities to put in place robust subregional and arc-wide governance arrangements. This will include:

- reconstituting the Oxfordshire Growth Board as a planning joint committee by April 2018, ensuring it is empowered to take decisions on the development, adoption and delivery of a strategic statutory spatial plan;
- establishing growth board arrangements for defined planning areas in the central section of the arc by April 2018, ensuring these are constituted as planning joint committees and empowered to take decisions on the development, adoption and delivery of a strategic statutory spatial plan(s);
- supporting the continued development of new and existing growth boards, with a view to their being constituted as statutory combined authorities, or mayoral combined authorities, as soon as possible and no later than 2022; and
- working with representatives of the Cambridgeshire and Peterborough Combined Authority, Oxfordshire Growth Board and other growth board(s) across the arc to establish an arc-wide 'Strategic Partnership Board' by Summer 2018. This should include recruiting an independent chair to convene the board and provide a clear link to Government, and agreeing this appointment with local partners.

Recommendation 9

Government should work with local authorities and any new delivery bodies from across the arc to prepare and publish a six-monthly update, with the first being published in April 2018, enabling the Commission to assess the progress achieved in delivering the recommendations set out in this report.

Data for the Public Good (December 2017)

In November 2016, the Government asked the Commission to identify which new technologies had the greatest potential for improving the productivity of the UK's infrastructure, and what steps Government should take to support the deployment of these technologies.

The Commission responded in December 2017, publishing its report *Data for the Public Good*.

The Commission found that new technologies like artificial intelligence and machine learning could help cut delays and disruptions across the UK's infrastructure network.

The benefits of enabling new technologies through better infrastructure data could include:

- cutting the numbers of delays and disruptions to train journeys by better planning maintenance and making repairs more quickly through the use of sensor networks and the application of machine learning;
- reducing the numbers of traffic jams on the roads by using smart traffic lights and other systems;
- responding to extreme weather events like snowstorms and floods in a more coordinated way;
- faster identification of leaks in the water network through data from smart water meters; and
- increasing competition between mobile and broadband operators by sharing data on signal and connection speeds – helping to end intermittent services.

The Commission concluded that these benefits will be fully realised only if steps are taken to improve the quality, consistency and availability of data, with companies and agencies sharing the data they have on how well their infrastructure operates – while at the same time taking account of the necessary security precautions.

The report recommended the establishment of a national framework for infrastructure data to drive up quality and consistency and promote a move away from data silos and towards greater sharing, whilst ensuring the protection of personal data. It recommended that a digital framework task group, whose chair would act as a national champion for this agenda, should have responsibility for driving progress.

The report suggested that this should form the first step towards developing a 'digital twin' of the UK's infrastructure – a digital model of the network spanning transport, energy, water and telecommunications, with predictive capability which could vastly improve how infrastructure is managed, maintained and planned in the future. The study concluded that the UK's strengths in artificial intelligence and machine learning make it well placed to lead this agenda, starting with a pilot digital twin project in 2018.

The Commission is pleased to report that progress is already being made on taking forward two key recommendations of the report. Plans to establish a digital twin pilot project are being advanced by the Alan Turing Institute, which will test the feasibility of digital twin models to help optimise and plan infrastructure. Separately, a range key stakeholders convened at the end of January 2018 to form the beginnings of a Digital Framework Task Group.

The Commission anticipates a formal response from Government, including any formal endorsement of its recommendations, within the year. The Commission will report on progress in implementing any endorsed recommendations in future Annual Monitoring Reports.

A full list of recommendations included in the report, *Data for the Public Good*, is included below:

Recommendation 1

The Government should task the Centre for Digital Built Britain (CDBB) with the establishment of a digital framework for infrastructure data, drawing together key organisations and existing initiatives both large scale (BIM) and smaller scale. The Commission recommended:

- a Digital Framework Task Group for infrastructure data should be established with a high-profile chair who can act as a national champion for this agenda;
- CDBB should set out a roadmap to a digital framework to develop standards and formats for collating and sharing data;
- key organisations which should be involved in the Task Group and in developing the framework include the Alan Turing Institute, Infrastructure Client Group, Construction Leadership Council, Infrastructure and Projects Authority, Cambridge Centre for Smart Infrastructure and Construction, Project 13, Office for National Statistics, Ordnance Survey, Open Data Institute and the recently announced Geospatial Commission and Centre for Data Ethics and Innovation. Wider consultation input should also be sought from the digital twin working group referenced in section 5;
- on standards development, to understand the existing standards landscape thoroughly at both a national and supranational level and to ensure agility, CDBB should consult extensively with industry on current behaviours and future requirements for how different infrastructure sectors and sub-sectors use data. CDBB may wish to commission an external standards organisation to conduct some of this work on their behalf;
- IPA and ICG should be engaged closely when designing final data standards and performance measures. The ICG amongst others will also be important to consult with respect to appropriate safeguards for commercial confidentiality;
- there should also be close collaboration with CPNI and NCSC on security requirements and levels of access and to develop standards for security, consistent with the objectives of the framework and an agreed approach to risk management; and
- To support effective implementation, CDBB should also lead a scoping exercise for a framework to assess industry progress in adopting and using the framework and to measure innovation.

CDBB should complete these actions and provide a public report on progress by 1 September 2018, setting out their recommendations for next steps. The National Infrastructure Commission would assess this as part of its wider role in monitoring progress against its recommendations.

Recommendation 2

The Infrastructure Client Group (ICG) and the Digital Framework Task Group Chair should lead industry engagement in the framework and cultivate a shift towards minimum levels of commercial confidentiality. The Commission recommended:

- ICG should report to CDBB on current industry compliance with minimum levels of commercial confidentiality agreed with CDBB in recommendation 1;
- ICG should work collaboratively with industry and the Digital Framework Task Group to identify opportunities to make data available and reduce the unnecessary use of commercial confidentiality (e.g. through reviewing and revising existing digital contracts), and should set out an agreed plan with milestones towards achieving the proposed shift; and
- ICG should report on progress in reducing the application of commercial confidentiality to infrastructure data by December 2018.

Recommendation 3

The Digital Framework Task Group (see recommendation 1) should work with the UK Regulators Network and relevant Government departments to review and, where possible, strengthen the role of economic regulators in driving up the quality and openness of infrastructure data. This should include:

- participation by the UK Regulators Network in the formulation of the digital framework set up by CDBB to ensure that it is effectively aligned with regulatory work on innovation and data;
- assessment of the potential role of regulators and of possible barriers within current regulatory frameworks regarding;
- ensuring compliance by regulated network operators and utilities with the national framework and adherence to data collection standards and formats;
- sharing of data to inform better understanding of asset performance and user experience;
- sharing of data across infrastructure sectors and the value chain to enable greater innovation in the development of new technologies and data management focused on better asset management and increased productivity;
- support for CDBB's engagement with network operators and utilities around the provision of data of verified quality to input to the development of a national infrastructure digital twin over the long term; and

- identification of relevant areas for further trials or studies to enable regulators, and regulated industries, to understand and demonstrate how monitoring technologies and data can support cost-effective maintenance decisions and proactive asset management, working with relevant research organisations.

Recommendation 4

CDBB should collaborate with the Alan Turing Institute (ATI) and the UK Infrastructure Transitions Research Consortium (ITRC) in pioneering digital twin models with predictive capability in the UK. This initiative should draw upon the AI expertise concentrated in the UK across universities and the public and involve:

- CDBB working with BEIS and other potential funders to take forward a digital twin pilot project to explore and experiment with the benefits of building a digital twin of a specific geographical area. CDBB, ATI and ITRC should draw upon input from the digital twin working group identified in section 5; and
- a project review of the pilot digital twin should be completed by October 2018. This should consider the lessons learnt for any future development of larger-scale or more complex digital twins, and the most effective institutional structures to support continuing progress in this area.

The Commission's 12 priorities: update



In June 2017, the Commission published a list of 12 immediate infrastructure priorities for the new Government. In each case, there was a commitment in principle to the project or policy, but there was also a risk that without timely ministerial decisions these projects could stall or collapse entirely. This chapter assesses the Government's achievements against each priority.

1. South-East Airport Capacity

Recommendation (June 2017)

The Government should complete all preparatory work needed for a Parliamentary decision to be taken on a third runway for Heathrow airport, and progress other aviation policy decisions to boost air traffic capacity, particularly in the south-east of England. This requires:

- a House of Commons vote on any finalised National Policy Statement on airports capacity in the south-east of England no later than May 2018;
- a Government response to the consultation on UK airspace published no later than October 2017; and
- a timetable for agreeing an updated national aviation strategy published no later than September 2017.

Airports National Policy Statement (NPS)

Between February and May 2017, the Government consulted on a draft Airports National Policy Statement (NPS). It was intended that further details to support the evidence base – including revised aviation demand forecasts and the Government's final air quality plan – would be presented for consideration during this initial consultation. However, the timing of the General Election meant this was not possible. Instead, a revised draft Airports NPS was published for consultation in October 2017 seeking views on the impact of changes to the document made since the previous consultation.⁵²

The Government remains publicly committed to realising the benefits that airport expansion at Heathrow can bring, and has stated that it does not expect this additional period of consultation to impact on the timetable for Parliamentary scrutiny of the NPS. It is expected that a final NPS will be brought before the House of Commons for a vote in the first half of 2018.

Although progress since the election remains on track, the Commission believes it is essential that a Parliamentary decision on a third runway for Heathrow airport is taken in summer 2018.

UK Airspace policy

A Government response to the consultation on the design and use of UK airspace was published on 24 October 2017.⁵³ The response confirmed that an Independent Commission on Civil Aviation Noise will be established by spring 2018. Other commitments included a new Secretary of State

call in power on airspace changes of national importance, new metrics and appraisal guidance to assess noise impacts and their impacts on health and quality of life, and changes to aviation noise compensation policy.

National aviation strategy

On 21 July 2017, the Government published a call for evidence seeking views on the proposed approach for developing a new aviation strategy which will set out the UK's long-term aviation policy to 2050.⁵⁴

The Government has identified a range of issues that will be examined in a series of themed consultation papers during 2018, with a final aviation strategy due to be published by the end of the year.

2. High Speed 2

Recommendation (June 2017)

The Government should introduce the hybrid Bill for phase 2a (Birmingham to Crewe) of High Speed 2 and publish the finalised route for Phase 2b (Crewe to Manchester and Birmingham to Leeds), including connections with High Speed 3, and let the major work contracts for the project, by the end of July 2017

Phase 2a and 2b

In July 2017, the Government published a hybrid Bill seeking the necessary powers to construct Phase 2a of HS2 (from West Midlands to Crewe) and announced the award of major works contracts, comprising design and construction preparation works, to a range of joint ventures. At the same time the Government announced its decision on route refinements for Phase 2b.

The High Speed Rail (West Midlands – Crewe) Bill received its second reading in the House of Commons on 30 January 2018 and it will now progress on to line-by-line scrutiny by MPs.⁵⁵

HS2 remains on track. To ensure that the maximum benefits from this transformational project are realised, the Government should ensure the necessary legislation for phase 2b is introduced by the end of 2019 at the latest.

3. Northern Powerhouse Rail

Recommendation (June 2017)

The Government should publish by the end of 2017 a single integrated plan for the first phase of Northern Powerhouse Rail, incorporating proposals for electrifying and upgrading the trans-Pennine (Manchester to Leeds) rail route, plans for the northern sections of HS2, and plans for the redevelopment of Manchester Piccadilly station, as set out in the NIC's *High Speed North* report.

In its *High Speed North* report (March 2016) the Commission concluded that there was a need for both immediate investment in northern transport and a longer-term transformation in rail connectivity to deliver an HS3 network incorporating the northern sections of HS2, upgrades to existing lines and sections of new track where necessary.⁵⁶

As the first phase of this programme, now referred to as Northern Powerhouse Rail (NPR), the Commission recommended the development of a single integrated strategy, bringing together the planned upgrade of the trans-Pennine line between Manchester and Leeds, the design of the northern part of the HS2 network, including options for links to Sheffield and Liverpool, and proposals for the redevelopment of Manchester Piccadilly station.

A single integrated plan for NPR as recommended by the Commission has not yet been published. However, agreement has been reached on the key ‘touchpoints’ between NPR and the northern phase of HS2 and, on 16 January 2018, Transport for the North (TfN) launched a consultation on its first ever Strategic Transport Plan. This sets out its agreed high-level strategy for NPR, although detailed options assessment for the major elements is still underway, with a full Strategic Outline Business Case expected to be submitted to government by the end of 2018.⁵⁷

The Trans-Pennine Route Upgrade also remains in the design and development phase, with an investment decision on the preferred option expected to be made shortly.

The Commission welcomes the publication of TfN’s Strategic Transport Plan. It will be important that Government sticks to the agreed timetable for upgrading the Trans-Pennine Route and reaches agreement, before the end of 2018, on the timetable and funding envelope for the Northern Powerhouse Rail network.

4. Crossrail 2

Recommendation (June 2017)

The Government should by the end of 2017 publish a plan, agreed with the Mayor of London, for the funding and phased construction of Crossrail 2, and for securing the necessary Parliamentary consent, taking account of the recommendations in the NIC’s Transport for a World City report.

Following the submission of an updated Strategic Outline Business Case (SOBC) in March 2017, Crossrail 2 was subject to an external review by the Infrastructure and Projects Authority.

The review concluded that further work should be undertaken to improve the affordability of the scheme, with a view to increasing the percentage of the scheme’s costs during construction to be met by London. Subsequently, the Mayor of London and the Secretary of State for Transport issued a joint statement on 24 July 2017 supporting the scheme and agreeing to examine ways to improve affordability while maximising the key benefits of the scheme – with a view to London meeting half the costs of the project during construction.⁵⁸

At Autumn Budget 2017, the Government again recognised the need for investment in London’s infrastructure to support its growth, while announcing an independent review of the funding and financing of Crossrail 2.

The Commission calls on Government to ensure the independent review of the funding and financing of Crossrail 2 is completed as soon as possible, with a view to setting out a firm timetable and funding proposal by the end of 2018. The next stage of consultation should follow to enable the introduction of a hybrid Bill later this Parliament, with the overall aim of opening Crossrail 2 in the early to mid-2030s.

5. Eastern Crossings of the River Thames

Recommendation (June 2017)

The Government should:

- take a decision on planning permission for the Silvertown Tunnel by the end of October 2017;
- announce its financing strategy for the new Lower Thames Crossing (to relieve the congested M25 Dartford Crossing), and begin the Environmental Impact Assessment process, no later than September 2017, paving the way for consultation on the detailed route in 2018 and the submission of the development consent application in 2019; and
- agree a policy with the Mayor of London for the next road crossing of the Thames in East London by the end of 2017, to enable substantial new housing development.

Silvertown Tunnel

The Planning Inspectorate issued a report of recommendation to the Secretary of State on 11 July 2017 following a 6-month public examination. Under the terms of the Planning Act 2008 the Secretary of State for Transport was expected to decide within 3 months of this date. However, on 11 October 2017, the deadline for a decision was extended by the Secretary of State by one month (to 10 November 2017) to enable “further consideration of the recent responses to the Secretary of State consultations on the scheme which relate to the updated UK plan for tackling roadside nitrogen dioxide concentrations published by Government on 26 July 2017”.⁵⁹

On 07 November 2017, the deadline for the decision was extended by a further 6 months (to 10 May 2018) to enable “further consideration of the effect of the scheme on air quality”.⁶⁰

Notwithstanding the need to ensure that any development proposal is consistent with the Government’s updated air quality plans, the Commission is concerned by continued delays to the decision-making process for the Silvertown Tunnel, which risks increasing the costs of the scheme to both the public and private sectors and reducing business confidence on investment in vital infrastructure schemes.

Lower Thames Crossing

In late 2017, Highways England appointed a financial adviser to provide advice on the Lower Thames Crossing project, which it now expects to be delivered using a combination of public funding and private finance. The link roads element of the scheme is expected to use the Private Finance 2 (PF2) regime to cover its up-front capital costs, while the design and build of the tunnel is expected to be funded directly from Highways England capital budget.

In October 2017, Highways England submitted its Environmental Impact Assessment Scoping Report to the Planning Inspectorate paving the way for consultation on the detailed route in 2018 and the submission of the development consent application in 2019.⁶¹

New road crossings

In June 2017, the Mayor of London published a draft Transport Strategy setting out a range of policies and proposals to reshape transport in London over the next 25 years.⁶²

The strategy recognised the importance of river crossings in east London to support new homes and employment, placing a priority on improving public transport links across the river.

The Commission is disappointed, however, that the document also made clear that any decision on future crossings will be considered only once the effects of the Silvertown Tunnel, the Lower Thames Crossing, planned public transport crossings and other improvements in the area are known. On this basis, formal consideration of a new river crossing at Gallions Reach and/or Belvedere would be unlikely to occur until the mid to late-2020s.

6. Flexible Power Systems

Recommendation (June 2017)

The Government should publish its plan for smart energy systems, as set out in its response to the NIC's Smart Power report, including the actions it will take to enable greater deployment of electricity storage, interconnectors and demand flexibility, no later than September 2017.

In July 2017, the Government published its Smart Systems and Flexibility Plan outlining 29 actions it intends to take alongside Ofgem and industry to remove barriers to smart technologies (such as storage and demand-side response), enable smart homes and businesses, and improve access to energy markets for new technologies and business models.⁶³

The Commission welcomed the publication of the document, which followed its own consideration of how policies to promote interconnection, storage and demand flexibility could create a more efficient and cheaper electricity system.

The Commission will continue to monitor the implementation of recommendations contained in its *Smart Power* report and will also monitor progress against the actions identified by the Government and Ofgem in their recent plan.

7. Renewable Energy

Recommendation (June 2017)

The Government should publish its firm forward plans for supporting renewable energy, at least to 2025, including the use of the remaining funds from the £730 million agreed in the last Parliament, by October 2017, and specific longer-term goals in the Autumn Budget.

In September 2017, the Government announced the results of the second allocation round of Contracts for Difference. This awarded up to an additional £176m of funding per year for renewable generation. Separately, the Government published its Clean Growth Strategy on 12 October 2017.⁶⁴ This included commitments to make available a further £557 million of funding for Contracts for Difference and to hold the next allocation round in spring 2019.

At Autumn Budget 2017, the Government committed not to introduce any new low carbon electricity levies until the burden of such costs are falling and confirmed that all existing contracts and commitments will be respected. However, no longer-term goals for supporting renewable energy have been announced.

8. Decarbonisation of Energy

Recommendation (June 2017)

The Government should publish its strategy for the decarbonisation of energy, including its emissions reduction plan, no later than October 2017, and set out its trajectory for the future level of the “carbon price floor” in the Autumn Budget.

The Government’s Clean Growth Strategy was published 12 October 2017. This set out plans to help meet near-term carbon budgets and to support the decarbonisation of heat, transport and power. The Committee on Climate Change has welcomed the Clean Growth Strategy’s strong commitment to decarbonisation, but has warned that existing policies will need to be firmed up and additional measures identified if the UK is to meet its fourth and fifth carbon budgets (covering the years 2023 – 2032).⁶⁵

At Autumn Budget 2017, the Government outlined its plan to keep the Total Carbon Price (created by the combination of the EU Emissions Trading System and the Carbon Price Support) at its current level. It confirmed that it will continue to target a similar price until unabated coal is no longer used. On the basis of current forecasts, this is expected to occur in the mid 2020.

9. Hinkley Point C / Euratom

Recommendation (June 2017)

The Government should by the end of the year publish a strategy and timetable for replacing the services provided by the UK's membership of Euratom to support the timely delivery of the new Hinkley Point C nuclear power station and any future nuclear projects.

In October 2017, the Government introduced the Nuclear Safeguards Bill 2017-19 to make provision for nuclear safeguards after the UK leaves Euratom. The Bill seeks to establish a domestic nuclear safeguards regime and gives the Office for Nuclear Regulation (ONR) the necessary powers to take on responsibility for meeting the UK's international safeguards and nuclear non-proliferation obligations.

Following the conclusion of phase 1 negotiations with the EU on the UK's withdrawal from the EU, both parties have agreed that the UK will be responsible for maintaining international nuclear safeguards in the UK in a way that provides "coverage and effectiveness equivalent to existing Euratom arrangements".⁶⁶

A written Parliamentary statement issued by the Secretary of State for Business, Energy and Industrial Strategy on 11 January 2018 confirmed that the Government would be seeking continuity with current Euratom arrangements to ensure that on 29 March 2019 the UK has the necessary measures in place to ensure that the nuclear industry can continue to operate.⁶⁷

10. Broadband and Mobile

Recommendation (June 2017)

The Government should, by the end of 2017, publish its final broadband Universal Service Obligation decision and set out minimum acceptable standards for mobile coverage, based on metrics which genuinely reflect where people live, work and travel. These should be followed within six months by a credible delivery plan, setting out the concrete steps that the Government will take to ensure they are met.

Broadband Universal Service Obligation

In April 2017 the Digital Economy Act 2017 became law, enabling the creation of a new broadband Universal Service Obligation (USO) with the aim of giving every household and business the right to request a broadband connection at a minimum speed of at least 10Mbps, up to a reasonable cost threshold – no matter where they live or work.

Following the Government's commitment to introduce a Universal Service Obligation (USO) through regulation, BT put forward its own offer in July 2017 to voluntarily provide this service across the country subject to the condition that it could recover its costs through charges for products providing access to its local access networks.

In December 2017, the Government announced that it would proceed with its planned regulatory approach, giving consumers the right to request a broadband connection with a minimum download speed of 10 Mbps (and minimum upload speed of 1 Mbps). The Government expects the USO to be in place by 2020 at the latest. Secondary legislation, giving effect to this date, is expected to be laid before Parliament later this year.

Minimum acceptable standards for mobile coverage

The Government has provided a high level statement of what it considers the “essential elements” of good quality coverage.⁶⁸ These include a high call success rate and the ability to deliver a range of the most commonly used services such as text, email, e-Gov services, banking and payment apps, health apps, online shopping, audio streaming, reading online news, mapping services and other basic apps. Despite the end 2017 deadline set in the Government’s response to the *Connected Future* report, however, further work is still needed to translate these into precise coverage expectations and identify how they will be achieved.

11. 5G Mobile

Recommendation (June 2017)

The Government and Ofcom should take the following steps by the end of 2017 to implement the recommendations from the NIC’s *Connected Future* report and prepare for the widespread deployment of 5G technology from 2020:

- complete the auction of 5G spectrum in the in the 3.4 – 3.6 GHz range and publish a timetabled plan to complete by the end of 2019 the auctions of other key 5G spectrum bands; and
- set out a comprehensive plan to enable the rollout of 5G services, including proposals for providing access to public sector buildings, land and other assets, and the commercial models for delivering high quality mobile services directly alongside the motorway network and main railway lines.

5G spectrum auction

In July 2017 Ofcom confirmed its plan to auction licenses to use 150 MHz of spectrum in the 3.4GHz band and 40 MHz of spectrum in the 2.3GHz band, increasing the airwaves available for mobile devices in the UK by almost one third. The 3.4GHz band has been identified as central to the rollout of 5G mobile across Europe.

To safeguard competition over the coming years, Ofcom decided to place a cap of 340 MHz on the overall amount of mobile spectrum a single operator could hold because of the auction – amounting to 37% of all the mobile spectrum expected to be useable in 2020.

Ofcom had planned to hold the auction in autumn 2017, but it was delayed following the decision by BT (EE) and Three to apply for a judicial review of the auction rules. A hearing took place in December 2017, following which the High Court rejected the case put forward by BT (EE) and Three and upheld Ofcom's decision. However, Three has now sought permission to appeal on to the Court of Appeal. The Court of Appeal is expediting this appeal and a hearing is now expected in February.

Ofcom remains keen to ensure that it can move as quickly as possible to hold the auction once the judgment of the Court of Appeal has been given. Within this context, Ofcom published the auction regulations for this spectrum award at the end of January 2018 and is currently accepting applications.⁶⁹ Ofcom has agreed not to formally qualify bidders until after the Court of Appeal's decision is announced, but expects to be able to proceed as quickly as possible with the auction following the Court of Appeal's judgment.

The Commission welcomes the steps that Ofcom has taken to ensure it can proceed as quickly as possible to hold the auction of spectrum in the 2.3 and 3.4 GHz bands following the conclusion of current litigation. The Commission agrees that it is in the public interest for the auction to take place as soon as possible given the significant and strong demand for access to the spectrum, and the direct benefits to consumers of faster, higher quality mobile data services that can be offered using the spectrum. The Commission renews its call on Ofcom to publish a timetabled plan for the completion of auctions of other key 5G spectrum bands as soon as possible.

Rollout of 5G services

An update on progress in providing 5G services, including mobile services directly alongside the motorway network and main railway lines, is provided earlier in this report as part of the Commission's review of progress in implementing the recommendations of its *Connected Future* report. This sets out the Commission's view that increased urgency is needed in developing commercial models for improving mobile coverage on the UK's major roads and rail lines.⁷⁰

12. Water and Flood Defenses

Recommendation (June 2017)

The Government should finalise the Strategic Policy Statement for Ofwat by the end of September 2017 and publish its review setting out proposals for the effective management of surface water flooding by the end of 2017.

Strategic policy statement for Ofwat

On 13 September 2017, a new strategic policy statement for Ofwat was laid in Parliament, setting out the Government's priorities for Ofwat's regulation of the water sector in England.⁷¹

This statement complements Ofwat's existing duties and places an emphasis on areas where Government expect the regulator to lead a shift in the water industry's strategic direction. These include securing the long-term resilience of the sector, protecting customers who are struggling to afford their charges and promoting markets to drive innovation and unlock efficiencies across the sector.

Surface water management

The 2016 National Flood Resilience Review included a commitment for Government to consider the issues relating to surface water in 2017.⁷²

On 19 December 2017, a written ministerial statement was issued providing an update on the work Government intends in relation to surface water management during 2018. It identified five key areas – covering the ‘national position’, ‘effective collaborative working’, ‘skills’, ‘maps and data’, and ‘forecasting’ – where Government intends to act to strengthen the current framework for surface water management at both national and local level.⁷³

Proposals to support these areas are currently being considered by the Inter Ministerial Group on Flooding. A report outlining actions and an implementation timetable is due to follow in spring 2018

The Commission welcomes the consideration of surface water management by the Inter Ministerial Group on Flooding during 2018, but remains disappointed at the apparent lack of progress made on this issue during 2017. The Commission renews its call for firm proposals for the effective management of surface water flooding to be published as soon as possible.

Appendix

Electricity interconnector projects:

PROJECT NAME	OWNERS	CONNECTING COUNTRY	CAPACITY	CAP AND FLOOR REGIME?	DELIVERY DATE/EST. DELIVERY DATE
IFA	National Grid Interconnector Holdings (NGIH) and RTE	France	2000MW	No	1986
Moyle	Mutual Energy	Ireland	500MW	No	2002
BritNed	NGIH and TenneT	Netherlands	1000MW	No	2011
EWIC	EirGrid	Ireland	500MW	No	2012
ElecLink	Star Capital Partners and Groupe Eurotunnel	France	1000MW	No	2019
NEMO	NGIH and Elia	Belgium	1000MW	Yes	2019
NSN	NGIH and Statnett	Norway	1400MW	Yes	2020
FAB Link	Transmission Investment and RTE	France	1400MW	Yes	2022
IFA2	NGIH and RTE	France	1000MW	Yes	2020
Viking	NGIH and Energinet.dk	Denmark	1400MW	Yes	2022
Greenlink	Element Power	Ireland	500MW	Yes	2021
GridLink	iCON Infrastructure	France	1400MW	Yes	2022
NeuConnect	Frontier Power, Meridiam and Greenage	Germany	1400MW	Yes	2022
NorthConnect	Agder Energi, Lyse, E-CO and Vattenfall	Norway	1400MW	Yes	2022
Aquind	Aquind Ltd	France	2000MW	No	2022

[Source: Ofgem]

Endnotes

- ¹ RIIO is Ofgem's framework for setting price controls for network companies. <https://www.ofgem.gov.uk/network-regulation-riio-model>
- ² Department for Business, Energy & Industrial Strategy, Ofgem (2017), Upgrading our energy system: smart systems and flexibility plan
- ³ Ofgem (2017), Clarifying the regulatory framework for electricity storage: Licensing
- ⁴ Ofgem (2017), Enabling the competitive deployment of storage in a flexible energy system: Changes to the electricity distribution licence
- ⁵ UtilityWeek (2017), UK Power Networks launches new flexibility tender. Accessed at: <https://utilityweek.co.uk/uk-power-networks-launches-new-flexibility-tender/>
- ⁶ Further information on the Energy Networks Association's 'Open Networks Project' can be found at the following link: <http://www.energynetworks.org/electricity/futures/open-networks-project/>
- ⁷ Aggregators are "organisations offering services to aggregate energy demand or production from different sources to act as one entity in providing services to the grid."
- ⁸ Ofgem (2017), Independent aggregators and access to the energy market
- ⁹ Association for Decentralised Energy (2017), Demand Side Response Code of Conduct Consultation
- ¹⁰ Department for Business, Energy & Industrial Strategy, Ofgem (2017), Upgrading our energy system: smart systems and flexibility plan
- ¹¹ Evidence supplied to the Commission by National Grid
- ¹² Ibid
- ¹³ Government, Ofgem and National Grid (2017), Joint Statement setting out the intention to establish the new company. Accessed at: https://www.ofgem.gov.uk/system/files/docs/2018/01/joint_statement_on_the_future_of_electricity_system_operation.pdf
- ¹⁴ Ofgem (03 August 2017) Press release: Ofgem confirms plans for greater separation of National Grid's electricity system operator role. Accessed at: <https://www.ofgem.gov.uk/publications-and-updates/ofgem-confirms-plans-greater-separation-national-grid-s-electricity-system-operator-role>
- ¹⁵ Department for Business, Energy & Industrial Strategy, Ofgem (2017), Upgrading our energy system: smart systems and flexibility plan
- ¹⁶ Energy Networks Association (2017), Opening Markets for Network Flexibility
- ¹⁷ Ofgem (2017), Unlocking the Capacity of the Electricity Networks
- ¹⁸ Department for Transport (24 July 2017), Joint statement on Crossrail 2 from the Secretary of State for Transport, Chris Grayling MP, and the Mayor of London, Sadiq Khan. Accessed at: <https://www.gov.uk/government/news/crossrail-2-a-way-forward>
- ¹⁹ Financial Times (2017), Transport for London warns Crossrail 2 could be delayed by decade. Accessed at: <https://www.ft.com/content/a1257c0a-a4f2-11e7-b797-b61809486fe2>
- ²⁰ Greater London Authority (2017), Draft new London Plan
- ²¹ Announced at Autumn Budget 2017. Accessed at: <https://www.gov.uk/government/publications/autumn-budget-2017-documents/autumn-budget-2017>
- ²² Greater London Authority (2017), Mayor of London Community Infrastructure Levy (MCIL) 2 Preliminary Draft Charging Schedule. The Mayor intends to commence levying MCIL2 charges from April 2019. MCIL2 charges will supersede the current MCIL1 levies and the associated planning obligation/S.106 charge scheme applicable in central London and the northern part of the Isle of Dogs
- ²³ TfL (2017), Land Value Capture: Final report. Accessed at https://www.london.gov.uk/sites/default/files/land_value_capture_report_transport_for_london.pdf
- ²⁴ Memorandum of Understanding on further devolution to London (2017). Accessed at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/597291/London-Devolution-MoU.pdf
- ²⁵ Press release: Greater Manchester Combined Authority (01 November 2017), Mayors call for more control over public services including skills, training and apprenticeship services
- ²⁶ NIC (2017), Congestion, Capacity, Carbon: Priorities for national infrastructure
- ²⁷ HM Treasury press release (01 October 2017), Northern transport gets further funding from government.
- ²⁸ Transport for the North (2018), Draft Strategic Transport Plan.
- ²⁹ Letter from Interim Northern Powerhouse Rail Director to the Chief Executive of the National Infrastructure Commission (December 2017).
- ³⁰ Ibid
- ³¹ Office of Road and Rail, Passenger rail usage statistics
- ³² Electrification of the North TransPennine route from Manchester to Leeds and York was announced in the 2011 Autumn Statement. The scheme was expected to be delivered in Control Period 5 (CP5) between 2014 and 2019
- ³³ Financial Times (21 July 2017), U-turn on rail schemes hits Northern Powerhouse plan
- ³⁴ TfN (2018), Draft Strategic Transport Plan accessed at https://transportforthenorth.com/wp-content/uploads/TfN-Strategic-Plan_draft_lr.pdf
- ³⁵ HM Treasury press release (01 October 2017), Northern transport gets further funding from government. This funding was also highlighted at Autumn Budget 2017. Details on junctions can be found in TfN's Draft Strategic Transport Plan
- ³⁶ TfN (2018), Draft Strategic Transport Plan, Strategic Road Studies
- ³⁷ Highways England press release (2017), Next generation Road Communications Network. Accessed at: <https://www.gov.uk/government/news/next-generation-road-communications-network>
- ³⁸ Transport Focus (2018), National Rail Passenger Survey. It should be noted that these figures relate to passengers' overall satisfaction with the reliability of the internet connect on their journeys and do not distinguish between Wi-Fi reliability and the reliability of mobile data while travelling.
- ³⁹ Data use per subscriber has increased to 1.86GB in the year to June 2017, an increase of 48% compared to 2016. Source: Ofcom (2017), Connected Nations 2017
- ⁴⁰ Department for Digital, Media, Culture & Sport and (2017), Commercial options for delivering mobile connectivity on trains: Call for Evidence

- ⁴¹ Department for Digital, Media, Culture & Sport and Department for Transport (2017), Commercial options for delivering mobile connectivity on trains: Call for Evidence. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/670551/Commercial_options_for_delivering_mobile_connectivity_on_trains_Call_for_Evidence.pdf
- ⁴² Department for Digital, Media, Culture and Sport (2017), Next Generation Mobile Technologies: An Update to the 5G Strategy for the UK
- ⁴³ A full description of the action carried out by Aberdeen City Council is provided in the Commission's 2016 Connected Future report.
- ⁴⁴ Ministry of Housing, Communities & Local Government (2017), Housing White Paper – Fixing our broken housing market
- ⁴⁵ Department for Digital, Media, Culture & Sport and HM Treasury (2017), Next Generation Mobile Technologies: A 5G strategy for the UK
- ⁴⁶ Ofcom (2017), Connected Nations 2017
- ⁴⁷ Department for Digital, Media, Culture and Sport (2017), Next Generation Mobile Technologies: An Update to the 5G Strategy for the UK
- ⁴⁸ Ibid
- ⁴⁹ Department for Digital, Media, Culture & Sport (2017), Next Generation Mobile Technologies: A 5G strategy for the UK
- ⁵⁰ Ibid
- ⁵¹ Ibid
- ⁵² Department for Transport (2017) Revised draft Airports National Policy Statement.
- ⁵³ Department for Transport (2017) UK airspace policy: a framework for the design and use of airspace.
- ⁵⁴ Department of Transport (2017) Call for evidence on the future of aviation in the UK.
- ⁵⁵ High Speed Rail (West Midlands – Crewe) Bill 2017-19. House of Commons: Second reading January 2018
- ⁵⁶ National Infrastructure Commission (2017), High Speed North.
- ⁵⁷ Transport for the North (2018), Draft Strategic Transport Plan
- ⁵⁸ Department for Transport (24 July 2017), Joint statement on Crossrail 2 from the Secretary of State for Transport, Chris Grayling MP, and the Mayor of London, Sadiq Khan. Accessed at: <https://www.gov.uk/government/news/crossrail-2-a-way-forward>
- ⁵⁹ Written Statement to Parliament (Oct 2017), Paul Maynard MP (Parliamentary Under Secretary of State for Transport), Planning Act 2008: Application for the proposed Silvertown Tunnel development Consent Order
- ⁶⁰ Written Statement to Parliament (Nov 2017), Paul Maynard MP (Parliamentary Under Secretary of State for Transport), Planning Act 2008: Planning Act 2008: application for the proposed Silvertown Tunnel development Consent Order, further extension
- ⁶¹ Highways England (2017) Environmental Impact Assessment – Scoping Report.
- ⁶² Mayor of London (2017) Mayor of London's Transport Strategy: draft for public consultation
- ⁶³ Department for Business, Energy & Industrial Strategy, Ofgem (2017), Upgrading our energy system: smart systems and flexibility plan
- ⁶⁴ HM Government (2017) The Clean Growth Strategy, Leading the way to a low carbon future
- ⁶⁵ Committee on Climate Change (2018), An independent assessment of the UK's Clean Growth Strategy: From ambition to action
- ⁶⁶ Joint report from the negotiators of the European Union and the United Kingdom Government on progress during phase 1 of negotiations under Article 50 of the Treaty on European Union on the UK's orderly withdrawal from the EU (December 2018)
- ⁶⁷ Written Statement to Parliament (11 January 2018), Rt Hon Greg Clark MP (Secretary of State for Business, Energy and Industry Strategy). Accessed at: <https://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2018-01-11/HCWS399/>
- ⁶⁸ Department for Digital, Media, Culture and Sport (2017), Next Generation Mobile Technologies: An Update to the 5G Strategy for the UK
- ⁶⁹ Ofcom (2018), Update on the regulations for the auction of spectrum in the 2.3 and 3.4 GHz bands. Accessed at: <https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2018/auction-regulations-update>
- ⁷⁰ National Infrastructure Commission (2017), Connected Future
- ⁷¹ Department for Environment, Food & Rural Affairs (2017) The Government's strategic priorities and objectives for Ofwat, Presented to Parliament pursuant to section 2A of the Water Industry Act 1991
- ⁷² HM Government (2016), National Flood Resilience Review
- ⁷³ Written statement to Parliament (19 December 2017) Dr Thérèse Coffey MP (Parliamentary Under Secretary of State for the Environment)

NATIONAL INFRASTRUCTURE COMMISSION

National Infrastructure Commission
5th Floor, 11 Philpot Lane
London
E3CM 8UD
@NatInfraCom